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THE

ART OF TANNING AND CURRYING LEATHER:

With an Account of all the
DIFFERENT PROCESSES
Made Uſe of in
EUROPE AND ASIA
FOR
Dying Leather Red and Yellow.

Collected and Publiſhed at the Expence of the
DUBLIN SOCIETY.

To which are added,

Mr. Philippo's Method of Dying the Turkey Leather, as approved of by the Society for the Encouragement of Arts, &c. and for which he had a Reward of One Hundred Pounds, and their Gold Medal, for the Secret.

LONDON,
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PREFACE.

THE ART of TANNING, and of CURRYING strong LEATHER, was for many centuries confined to the *Britiſh* iſles: their rich paſturage produced the beſt hides in the known world, and the extraordinary good quality of their native oak, gave the palm of commerce in this article to *Great-Britain* and *Ireland*, which was ſold or bartered for other commodities to *Spain*, *Portugal*, *France*, and *Italy*. The potentates of theſe parched and ſterile countries, long viewed this profitable and extenſive trade with a jealous eye, and as neceſſity is the mother of invention, all arts were uſed to bring their meagre hides to perfection.

In the laſt century, the great lights of philoſophy, illumined the dark paths of the mechanic arts. *France* held out her royal bounty, to induce the learned of her country to inveſtigate the proceſſes of her manufactures, and to remove thoſe obſtacles and abſurdities, to which all manufacturers ſeem obſtinately chained and fettered. National edicts ſucceeded theſe diſcoveries, and the ignorant operator was puniſhed with confiſcation of his goods, if he did not comply with the methods laid down by theſe learned men, when approved of by the ACADEMY OF SCIENCES, and the INTENDANT OF COMMERCE.

Whilſt our rival in trade was making ſuch ſtrides towards the perfection of her manufactures, and was daily ſeducing our artiſts under her protection, *Great-Britain* and *Ireland* were ſunk in a lethargy, from which they are now, too late, recovering.

In the ART OF TANNING, great improvements have been made in every ſtate of *Europe*, whilſt we ſtill purſue the method practiſed by our fore-fathers a thouſand years ago. The high value of our lands, and the cutting down of our woods, have raiſed the prices of raw hides and of bark ſo much, that of late years the tannery of *Ireland* has been a loſing trade; which, added to the progreſs made in this manufacture by foreigners, who now chiefly ſupply their own markets, has cauſed the export of tanned leather to decline, and that of raw hides to increaſe to the loſs of 500,000l. *per annum* to this impoveriſhed country.

The DUBLIN SOCIETY foreſeeing this calamity for a ſeries of years, offered conſiderable premiums for the diſcovery of a ſubſtitute for oak-bark: heath, briers, tormentil, oak ſaw-duſt, and many other vegetables were recommended; but, after repeated experiments, they were found not to have ſufficient ſtrength for thick leather, or were not to be had in quantity to anſwer the national demand.

In the year 1746, a cow ſkin and a calf ſkin were laid before the SOCIETY by *Henry Bond*, Eſq. of the county of *Armagh*, which he declared he had tanned with the bark of the common *Scotch Fir* only, without any other bark. They were examined by ſeveral perſons well ſkilled in leather, and were judged by them to be very well tanned.

Theſe ſkins remained in his bark-vat but three months and a half; he put twenty pounds weight of dried bark, free of the outſide huſky excreſcence, in his vat; but for ſoal-leather, a greater quantity of bark, and a much longer time for lying in the vat, is neceſſary.

The SOCIETY ſtrongly recommended this experiment, and requeſted ſuch as had this ſpecies of wood growing on their eſtates, to cut down the trees in the month of *May*, *June*, or *July* next enſuing; but no one had the ſpirit to purſue Mr. *Bond*'s diſcovery.

In the year 1768, Dr. *Mac Bride*, a gentleman of extenſive chemical knowledge, diſcovered a method of ſhortening the tanning, and of improving the quality of the leather.

This diſcovery took its riſe from a ſeries of experiments, which were originally inſtituted and carried on with a view of improving certain branches of medical knowledge, and thus, like moſt other diſcoveries, ſprung from a ſource whence it could leaſt of all have been expected.

The Doctor having communicated the importance of his diſcovery to the SOCIETY, at his requeſt, they engaged Mr. *Laban*, a ſkilful tanner, to make a trial of this new method, and the SOCIETY paid the expence of fitting up an old tan yard for this purpoſe, which was eſtimated at fifty pounds. A committee of the SOCIETY frequently viſited the proceſs; and, in *September*, 1768, they made the following report, *viz.*

That eighty dozen of calve ſkins had been made and ſold, which were not longer in finiſhing than three months, and would have been done in a much ſhorter time, had the alterations in the tan-yard been completed. That, in the Doctor's new method, the bark which has been exhauſted in the common way, is made uſe of with greater advantage, and produces a great ſaving in bark.

That from a variety of experiments made by Mr. *Laban* it appeared, that two months is the ſpace of time required by the new method of tanning calve ſkins in large quantities, although it is practicable to tan ſmall quantities completely within the ſpace of ten days.

That this method is ſo extremely ſimple and eaſy, that it may be introduced immediately into the common tan-yards, as it requires no other alteration than that the tan-vats be defended againſt rain. That the expence of the new-diſcovered materials and of the utenſils for preparing them is ſo trifling, that they cannot amount to more than five ſhillings *per cent.* on the value of the goods tanned.

The COMMITTEE OF COMMERCE having taken this branch of trade into their conſideration, ſpent ſeveral weeks of the laſt winter, with indefatigable attention in their enquiries.

In the courſe of this examination, they called on Mr. *Laban* (who had then retired from the buſineſs) for further information of the importance of this diſcovery; and he laid before the Committee the following comparative view of the expence of Dr. *Mac Bride*'s method, and of the common method ſtill practiſed, by which the profits appear to be in favour of the former more than twenty *per cent.*

Firſt Coſt and Expences of 100 hides Tanned into Uppers, by the Old Method.

	l.	s.	d.
100 hides, at 1l. 5s. *per* hide	125	0	0
Intereſt, at 6 *per cent.* for 18 months, the uſual time required to tan theſe hides	11	5	0
100 barrels of bark, at 6l. 10s. *per* ton — — —	48	15	0
Journeymens wages for 18 months on 100 hides —	7	16	0
N. B. One man will work 500 hides in one year, liming, maſterings, &c. at 1s. *per* hide — —	5	0	0
	197	16	0

Firſt Coſt and Expences of 100 hides Tanned into Uppers, by Dr. MAC BRIDE's Method.

	l.	s.	d.
100 hides, at 1l. 5s. *per* hide	125	0	0
Intereſt, at 6 *per cent.* for 12 months at moſt — —	7	10	0
80 barrels of bark, at 6l. 10s. *per* ton — — —	39	0	0
Journeymens wages — —	5	4	0
Liming, &c. — —	5	0	0
	181	14	0
In favour of the new method	16	2	0
	197	16	0

Firſt Coſt and Expences of 100 hides Tanned into Soal Leather, by the Old Method.

	l.	s.	d.
100 hides, at 1l. 5s. per hide	125	0	0
Intereſt, as before ——	11	5	0
Bark, as before — —	48	15	0
Wages, ditto — —	7	16	0
To raiſing the hides, at 2s. *per* hide — — —	10	0	0
	202	16	0

Firſt Coſt and Expences of Tanning 100 Hides into Soal Leather, by Dr. Mac Bride's Method.

	l.	s.	d.
100 hides, as before — —	125	0	0
80 barrels of bark, ditto —	39	0	0
Intereſt for 9 months, at 6 *per cent.* — — —	5	12	6
Journeymens wages for nine months on 100 hides —	3	18	0
To raiſing, &c. at 6d. *per* hide	2	10	0
	176	0	6
In favour of the new method	26	15	6
	202	16	0

Which ſaving of 26l. 15s. 6d. added to 16l. 2s. makes 42l. 17s. 6d. ſaving on 400l. 12s. And a further profit is ſaid to ariſe to this new method, by encreaſing the weight and ſolidity of the leather about eight pounds in ſeventy.

It appears that the Doctor's diſcovery conſiſts partly in rendering the hides more ſuſceptible of the impreſſion of the ooze, and partly in making the ooze more penetrating; but as he has hitherto thought proper to communicate his ſecret only to one company, who carry on the buſineſs at *Belfaſt*, the publick are hitherto deprived of the benefit which might ariſe from it.

A letter was produced to the COMMITTEE OF COMMERCE, from Mr. *Mac Tier*, who manages the affairs of this company, in which he declares, that the time ſufficient for tanning butts or uppers thoroughly, by the Doctor's method, is from ſix to nine months, according to their weight, and that the very heavieſt *ſoal* leather does not require more than ten months.

More than three hundred hides have been brought from this tannery, and ſold in *Dublin*, and ſeveral have been exported to *Spain:* no complaints have hitherto been made of the quality of this leather, and probably another ſeaſon will confirm this diſcovery to be of great importance to the trade of *Ireland*.

The tanners of *London* have of late applied boiling water, or boiling *ſpent ooze*, on the tan cakes, now generally thrown away or ſold to the poor for fuel: by this application of hot water, a ſtronger ooze is obtained, than was at firſt produced from the new bark, not can all its ſtrength be extracted by the firſt boiling: it is uſed in the common manner when cold. This muſt be a very great ſaving of bark, and ſeems well worth the attention of the *Iriſh* tanners, who buy their bark at ſo dear a rate; particularly if they follow the method of *ſcouring* with bark liquor, as recommended in the following treatiſe.

It is certain that no ligneous ſubſtance will produce all its aſtringent ſalts, without hot water, and as a proof that they are not all extracted from the bark in the common method, we need only refer to the hot-beds made with the old tan cakes uſually purchaſed by the gardeners.

And there cannot be a doubt, but that coppice-oak-wood, or branches, cut and ground as bark, will be found by the application of hot water, to render in proportion to their ſpecific gravity, a ſtronger ooze than the bark itſelf, though more ſlow in parting with its ſalts.

The SOCIETY have been pleaſed to charge me with the publication of this treatiſe. I have accepted the laborious taſk with pleaſure, being perſuaded my time cannot be employed in a more national object. I flatter myſelf the generoſity of that patriotic ſociety in printing and diſperſing this work, at their expence to the tanners of *Ireland*, will be amply rewarded by the encreaſe of the exports of tanned leather, the natural commodity of this country, to its utmoſt bounds.

The *French* manufacturers abound with technical terms; where thoſe of the *Iriſh* tanners correſponded, I have made uſe of them, and where deficient, I have endeavoured to explain the proceſs by the moſt familiar expreſſions, ſo as to render it intelligible to thoſe, for whoſe uſe it was intended.

C. V. A Member of the Society.

Dublin, Oct. 1,
1773.

PREMIUMS for importing Bark, and exporting Leathern Goods.

A premium of ten ſhillings per ton will be given to the perſon or perſons who ſhall import into this kingdom good and merchantable oak-bark fit for tanning, from the eaſt and northern countries, *Spain*, *Holland*, or *America*, between the 1ſt day of *November*, 1773, and the 1ſt day of *November*, 1774, provided that the ſaid premiums ſhall not exceed the ſum of 300l. and if it ſhould, then the ſaid ſum of 300l. to be divided proportionably to the importers, according to the quantity of ſuch bark by each of them reſpectively imported.

To be adjudged the 10th of *November*, 1774.

A premium of 10l. per cent. on the exportation of all kinds of leathern goods, that ſhall be well and merchantably wrought up and exported between the 1ſt of *November*, 1773, and the 1ſt day of *November*, 1774, provided the amount of the ſaid premiums adjudged to the claimants, ſhall not exceed 200l. and if it ſhould, then the ſum of 200l. to be divided proportionably to the claimants, according to the value of leathern goods of all kinds, by each of them reſpectively exported, and the ſaid leathern goods for exportation, ſhall be ſubject to the inſpection of a perſon to be employed by the Society.

To be adjudged the 10th of *November*, 1774.

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THE

THE

ART OF TANNING.

Of Hides and their Qualities.

THE *Iriſh* Hides are naturally thick, and fill better than thoſe of *France*, owing to the excellent paſturage of *Ireland*; the market for theſe is at *Namur*. Hides with black hair are not eſteemed; this is one of the many ridiculous notions which prevail amongſt Artiſts, which a phyſical knowledge only can remove, and hitherto this has not gained ſufficient ground to expel theſe vulgar ideas.

The Hides of Bulls are leſs ſolid, make a thinner Leather than others, but yet ſtrong in proportion; for the ſame reaſon that animals grow fatter by being deprived of their genital parts, their Hides muſt grow thicker, more full of juice, and of a more flexible texture. Therefore the Leather of Bulls ſhould only be worked up into inſide ſoals and women's ſhoes.

I obſerve that in *England* as well as in *France*, Cow Hides are eſteemed ſtronger and better than Oxen; but Bulls Hides ſtill have their value. For this reaſon, the Tanners pretend that they buy none but Cow Hides, and the Butchers will tell you they kill none but Oxen, becauſe the fleſh is moſt valued for the Table, ſo that it is become a proverb in *France*, to ſay with the Tanners, *all Oxen are Cows*, and with the Butchers, *all Cows are Oxen.*

Of Green Hides.

It is uſual in *France* to weigh the Hides green, and to mark the weight by certain cuts or nicks in the tail.

Hides are counted ſmall, and of leſs value in proportion, when they weigh 60 pounds or under; when they exceed 60 pounds, they are bought as large Hides; the higheſt is 35 livres the hundred weight, that is 7 ſols a pound, but this includes the horns, ears, part of the ſkull, dirt, water, and blood, collected in the ſlaughter-houſe.

To indemnify the Merchants for this waſte, an abatement is made from 2 livres 10 ſols, to 5 livres in every ten. So that a green Hide in the hair as taken from the carcaſe, is reduced by this allowance 5, 6, or 7 ſols. The price varies often; in 1745, when there was a murrain among the horned cattle, and alſo a war, the value was encreaſed one half.

Cuſtom has prevailed time immemorial, to weigh and ſell the Hides in the Hair, with horns, ears, lips, &c. and in that ſtate ſome will weigh 100 pounds; but the loſs in weight after being tanned and dried, is conſiderable, ſometimes more than half the firſt weight.

The Butcher, to encreaſe his profit, often impoſes on the Buyer by theſe means, 1ſt, by keeping his cattle in a ſtable with little or no litter, in order to increaſe the quantity of muck and dirt on the belly and tail: 2dly, by leaving a greater quantity of the ſkull and bones of the head : 3dly, by ſteeping the Hide in the water, blood, and dirt of the ſlaughter-houſe ; but the Buyer muſt examine and guard againſt all theſe impoſitions.

Of Salted Hides.

Such Hides as the Butchers cannot immediately diſpoſe of to the Tanners, muſt be ſalted, leſt they putrify and corrupt; this is done with 3 pounds and a half, or 4 pounds of Salt (de morue) or Salt mixed with Alum, which is lightly ſcattered over the fleſh ſide, obſerving to put a little more at the head, and along the back and edges, as being the moſt difficult parts to ſave.

In winter, it will require ſometimes 8 or 10 pounds of Salt to a Hide, becauſe they dry but ſlowly, and the danger of putrefaction at that ſeaſon continues longer.

The Butchers of *Paris*, who uſually deliver their Hides every 15 days or 3 weeks, and ſometimes longer, muſt of neceſſity ſalt their Hides, and they allow the Tanner 5 pounds in every Hide to be deducted from the weight.

In 1673, an agreement was made between the Butchers and Farmers General of *France*, by which they were obliged to furniſh the Butchers with Salt ſcraped up from the bottoms of the veſſels which had been employed on the *Newfoundland* Fiſheries, and on taking the Cod out of the hold of the veſſel, a great quantity of Salt falls off; it is thus collected for the uſe of ſalting Hides only (hence it is called Salt of Morue, or of Cod). This agreement was renewed in 1726, when it was ſtipulated that the Butchers ſhould pay 16 livres 19 ſols for a minot (or ¼ of a ſextier) of this Salt, beſides the expence of Officers, Meaſurers, Porters, *&c.*

Every Butcher muſt return the number of cattle he propoſes to kill the month following, and the quantity of Salt he ſhall have occaſion for, computing 4 pounds of Salt for every hide.

The *Hungarian* Leather Tanners alſo are ſupplied with this Salt, on condition that they mix in every minot (or ¼ of a ſextier) 8 pounds of pounded Alum at their own coſt, and alſo aſhes to prevent their making uſe of this Salt in their kitchens, or for domeſtic uſe.

So that Tanners Salt ſtands them in 25 livres a minot, or 4 ſols a pound, inſtead of 12 ſols, the price of the common Salt. The mixture of Alum renders this Salt uſeleſs for any other purpoſe.

In the ſea-ports they uſe the worſt of Salts (called the *Sardina* Salt, another pickled fiſh) and the Butchers thus ſituated, would have a great advantage if the Farmers General had not an eye over them.

The Hides being ſalted, they are folded in two, lengthways, ſo that each extremity falls on its oppoſite; then they are folded again, beginning with the pattes, then the navel towards the back, then head to tail, and tail to head; this folding is finiſhed by another which doubles the whole, and forms a ſquare from one to two feet on each ſide.

The ſalted Hides are piled in threes and fours in a pile, and they are thus left that the Salt may penetrate for the ſpace of three or four days.

When the Salt has had time to penetrate the texture of the Hides, they may be dried without danger of corrupting; for this purpoſe, they are extended on a perch, the fleſh ſide outwards, obſerving to let more than half from the hind quarters hang down on one ſide, that the tender and thin parts may not dry quicker than the thickeſt.

It commonly requires 8 days in ſummer, and 15 in winter to dry a Hide. When dry, they loſe about four-ſevenths of the weight as delivered from the carcaſe; thus a Hide green of 70 pounds, contains 40 pounds of ſuperfluous moiſture, and will weigh but 30 when dried.

Of waſhing the Hides.

When the Hides are green, that is, when they are freſh, they are plunged into water, to cleanſe them from the blood and filth of the ſlaughterhouſe; this is an occupation ſo neceſſary, that every Tannery ſhould be fixed on the banks of a running ſtream, the water of which muſt not be ſo hard and aſtringent as well-water; if the ſtream be rapid, the Hides muſt be faſtened to two poſts fixed in the bed of the river.

Dried Hides are likewiſe plunged into water, but require a longer time to ſoften than green Hides.

They are taken out once each day, and laid on the beam, where they receive a ſcraping with a round knife; ſometimes they are trod or trampled, to render them more ſupple and pliant, and to make them ſoak quicker; and in this manner they are treated daily, ſoaking and trampling them, until they be pliable and thoroughly ſoaked.

They are then plunged into water, until they appear ready to corrupt, for the more they are ſoaked, the better they will tann, and the better they will be in every reſpect.

Yet there is a proper time for keeping them in water; their tendency to corrupt may be known by their fœtid ſmell, and this muſt be minutely attended to. It muſt alſo be conſidered, that ſome waters will cauſe them to corrupt ſooner than others, ſuch in particular, as thoſe ſtreams where Dyers waſh their cloaths, if they be higher to the ſtream than the Tannery; fat groſs Hides will require about ſix hours ſoaking; Cow Hides twenty-four, and Calve Skins forty-eight hours.

If the Hides are ſalted, they will require two, three, or four days, according as the weather is hot or cold; they are taken out every day for the ſpace of two hours, that the water may penetrate better, and they are ſtirred about in the water to cleanſe them from the filth and ſalt; the laſt time they are taken out, they are rinced by force of hands to ſqueeze out the ſalt. Care ſhould be taken in rincing them, not to drive them to the bottom of the brook, where the ſtones, gravel, mud, *&c.* may hurt them.

If a Fulling-Mill be near the Tannery, it is of great advantage; for a Hide will be more ſupple, better rinced, ſooner pliable, and fitter for the next operation in one hour, under the hammer of a Fulling-Mill, than a whole day by men's hands; but the ſcraping muſt not be omitted to render the hair and fleſh more ready to depart from the Hide, and which comes off the eaſier, in proportion to the ſtate of pliability it is brought to.

Before dried Hides are fleſhed (fleſh ſcraped off) they muſt be ſtamped with the feet, the head cut off from the mouth to the eyes, the ears cut off, the bones of the ſkull cut out, the fleſh ſcraped, and all ſuperfluous parts taken off. Green Hides require leſs ſcraping than dried Hides.

After ſcraping, they muſt again be rinced in running water, and then extended on a perch to drain for twenty-four hours; during which time, they muſt be turned twice, and twiſted at the extremities, where the water naturally ſettles. This delay of twenty-four hours may be very well ſaved, by laying the Hide on the beam, and paſſing the round knife over it, then leaving it to dry twenty-four hours; yet there is ſome danger of leaving the Salt in them by this method.

Of Liming the Hides.

To prepare the Hides for the penetration of the Tan, the pores muſt be dilated, and the ſubſtance ſwelled; this is done by various methods; it is our buſineſs to explain the whole; for on this firſt operation depends the ſucceſs of the reſt. A Hide cannot be well tanned if it be not well handled in the ſcowring and liming. And although we are now going to treat of the method of Liming, we muſt advertiſe the Reader, that this is the worſt of all we are about to deſcribe.

The moſt ancient method practiſed to prepare Hides for the Tan, conſiſts in adding Lime to the Pits to ſcower and ſwell them. The Lime being an abſorbent Earth, produces in water a ſaline alkaline cauſtick matter, which attacks, corrodes, and burns all Animal Subſtances thrown into it; for this reaſon, it is uſual to let the Lime be thoroughly ſlacked in water, that the fire may be all caſt out of it before the Hides are laid into the Pits.

One cubic foot (or a minot) of Lime coſts at *Paris* 20 ſols, and the muid, which contains 48 cubic feet, coſts 50 livres. Each Hide requires about $\frac{1}{3}$ or $\frac{1}{4}$ of a cubic foot of Lime.

Where Lime only is uſed, there muſt be many Pits, into each of which the Hide muſt ſucceſſively be paſſed, in the ſpace of ten, twelve, or fifteen months. When the Hide is perfectly ſoftened, it muſt be put into a dead pit, that is, into a pit which has ſpent all the fire of the Lime; it muſt be intirely covered by the water. In this pit it is left eight days, after which they muſt be taken out and piled up for eight days more.

After theſe eight days, they muſt be again put into the ſame pit as before, and ſo alternately eight days out and eight days in, for two months;

this is the time a dead pit requires to take off the hair.

The different provinces of *France* follow different methods with their Lime Pits. In *Angoumois*, they uſe twelve pits; the two firſt *dead* pits, the four next *weak*, the ſix laſt *alive* or *quick*; each is compoſed of two barrels of Lime with one ſack of Aſhes.

In *Poitou* they uſe five pits; two dead ones, and three *alive*; each has from one to two barrels of Lime, with one ſack of Aſhes. In *Britanny* they have ſix pits, the firſt dead, the ſecond weak, and the four laſt alive. Others have ſix pits, all *alive* or of *quick Lime*, which they encreaſe in ſtrength by little and little, by a progreſſive addition of Lime and Aſhes; and theſe Tanners never take the hair off, until they come out of the fourth or fifth pit, thinking that the hide ſwells or raiſes better in the hair, than (in tripe or) without hair.

In *Auvergne* they compoſe their pits with a Lye of Aſhes, mixed with quick Lime, and they make three pits of one month each. In *Limouſin* the pits laſt ſix months, aud are compoſed of Lime and Aſhes. In *Lauguedoc* the pits laſt eight or ten months, and are alſo compoſed of Lime and Aſhes. In *Champagne* and *Luxembourg*, they allow from fifteen to eighteen months to a pit, repleniſhing it now and then with a ſmall quantity of Lime. In *Dauphiny* they make four pits ſucceſſively; they uſe more Lime than any Tanners in *France*, and their Leather is the worſt.

Each Tanner in *France* follows the practice of his Father, or the experience he has acquired; it appears, however, that the great number of pits ſignifies nothing, and only produces an extraordinary expence in Lime and Aſhes. The Hides will raiſe or ſwell only in a certain time, beyond which, they will be burnt or dried up. They grow as thick in three or four pits, as in ſix or a dozen.

Another very good Method is as follows,

Suppoſe the Stock of Hides to be 128, all ſtrong groſs Hides, take 16, the one-eighth of the whole, and dip them in the pit; this pit being refreſhed for four days, will ſerve during four days as a freſh pit; and thus 128 Hides may be twelve hours in this pit, 16 at a time, or the firſt 16 may be ſuffered to remain ſomewhat leſs, and the laſt 16 ſomewhat more.

The pit which, during four days, has ſerved eight times as a new pit, will ſerve eight days as a ſecond pit for 128 Hides; each parcel of 16 Hides will paſs twenty-four hours in the pit; it will alſo ſerve as a third pit, or a weak pit, for eight other days; it will ſerve for a pit for peeling, or a third dead pit for eight days; it will ſerve for a ſaving pit, or a ſecond dead pit, during eight days; it will alſo ſerve for a dead pit for 128 others, for eight days; then the liquor of this pit, which has ſerved in ſix different qualities for ſix times 128 Hides, in the ſpace of forty-four days, being ſpent and good for nothing, is caſt out; the fifth is emptied into its place, and ſo of the reſt; the freſh pit is by that means emptied, and is renewed as before mentioned.

In this manner of managing the pits, we ſee, that of the 128 Hides, there is never more than 16 at once in the new pit, and that for only twelve hours in four entire days; in all the other pits they are ſeven times as long in the retreat or pile as in the pits; there are four pilings, three of which are of 32 Hides, and one of 16, ſo that of the 32, 16 are one week above, and one week under the 16 others; this order is obſerved as well before as after the hair is taken off.

The Method of Poliſhing, or taking off the Hair.

The Hides are known to be in a proper ſtate to be ſhaved, when by pulling the hair gently with the hand, it comes off without any great reſiſtance. This commonly requires two months in the dead pit; but antecedent to this operation, they are left in pure water twenty-four hours, after which they are rinced and laid upon the beam. A round or ſemicircular knife (or a ſharp ſtone, which is rather better) is uſed for this operation.

Sand is alſo neceſſary to aſſiſt in this work, but it muſt be the fineſt of river ſand; when this cannot be had, ſifted cinders and aſhes are ſubſtituted in its place; this laſt requires many careful waſhings and rincings to diſcharge it from the Hides, whereas the ſand by its gravity is readily diſcharged and waſhed off.

Whether the knife or ſtone be uſed, great care muſt be taken that no inequalities lie between the Hides and the boards of the beam.

As ſoon as the Hides are ſhaved and rinced, their quality may be known; the beſt are when the white veins appear; theſe prove that the veſſels of the Hides have been properly diſcharged, without prejudice to the Hide; they are then ſaid to be Hides in tripe, becauſe they reſemble the inteſtines of animals, both in conſiſtence and colour.

Mr. *Deſbilletes* ſays, that Ox-hides, as ſoon as they come to the Tannery, ſhould be ſprinkled on the hair ſide with powdered broom, gathered in the ſecond ſeaſon, and being left in that ſtate three or four days, the hair begins to fall off, eſpecially if aſhes are caſt on them to facilitate the operation.

Mr. *Deſbilletes* alſo ſays, he has learned from *England*, that the beſt method of taking off hair or wool from raw hides, is to make a ſtrong decoction of * green broom cut fine, or of common thorny broom, if the green broom is not to be had; and the Hides or Skins being ſteeped in this two or three days, the hair or wool may be plucked off clean, without the help of Lime; by this method the Hide is ſecured from the injury of the Lime, and much time is gained.

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* As moſt parts of *Ireland* abound in green broom, this experiment, which muſt contribute ſo much to the good quality of the Leather, appears worthy of attention.

The Concluſion of the Pit-work.

The Hides being cleanſed from the hair, are put into a weak pit, that is, into a pit that has been often uſed, as before deſcribed; they remain here four months, during which time they are in and out ſucceſſively, eight days at a time; ſome take them out and put them in oftner; the Hides are ſtill better for this repeated operation.

After four months they are taken out of the weak pit, and put into a new pit compoſed of two barrels of live Lime, ſlacked with a ſufficient quantity of water; they are taken out and piled up after eight days, and ſo remain eight more; and then eight days more in the pit, and ſo on for four months longer.

Every time the Hides are taken out, the Lime muſt be ſtirred about with poles; whilſt the Lime is agitated and in motion, two men with long pincers drag the Hides one by one, from end to end of the pit, and then pile them; this is done that all parts may be equally covered with the Lime; when this is done, the Lime ſubſides, and the water remains perfectly clear.

The Hides have now been in three pits, *viz.* a dead pit, a weak pit, and a live pit, in the ſpace of ten months; and the year is completed with another live pit; they are managed in this pit juſt as in the three preceding, for the ſpace of two months.

To give an idea of the exact quantity of Lime neceſſary for a pit, I will ſuppoſe a barrel of

Lime to be 22 inches in diameter, and 32 inches high, its ſolidity will be 1216 cubic inches, or about 8 feet and a half, and it requires 2 barrels, or 17 cubic feet of Lime for a new pit of 80 Hides. Theſe are ſometimes divided into 4 piles of 20 each, that is, 20 are put into the pit for two days, when theſe are taken out, and 20 others are put in, and ſo on; thus all the Hides in the ſpace of eight days, have been two days in the pit, and ſix days in piles. Every two months the pit is renewed with 2 barrels of Lime when a new pit is required; or it will ſerve for the two following months as a weak pit, without any additional Lime, after which it is called a dead pit, and only ſerves to prepare the Hides for the ſhaving off the hair.

Of the River-work.

The Hides having been a year in theſe four pits, are ſoftened and filled as much as neceſſary; they are then to be fleſhed and to be ſucceſſively watered and beamed, that is, to be ſcraped on the beam with a blunt knife of a ſemicircular form, to preſs out the Lime, and then to be rinced in the river, and ſo on alternately. This gives the Grain to the Hide, renders it ſupple and better prepared to receive the Tan; this preſſing and rincing muſt be continued till all or moſt part of the Lime is extracted; thoſe raiſed with barley, require more rincing and waſhing.

Of Pigeons Dung and other Matters added to the Lime, by the Engliſh *Tanners.*

We have ſhewn before, that in *France* they add a certain quantity of Aſhes to the Lime, whoſe alkaline cauſtic corrodes the Hide, and cauſes the hair to peel off. Many other ingredients would produce the ſame effect, but the beſt are thoſe that raiſe or fill the Hides ſooneſt. I have lately ſeen a great Tannery at *Oxford*, where they alſo uſed Lime; the Hides were but three weeks only in the pits, and after they had heen beamed and watered, they were laid eight days in pigeons dung, but each day taken out for half an hour and piled up; there are ſome leave them in this dung fifteen days or three weeks.

Pigeons dung ſoftens the Hides hardened by the Lime; it gives them a colour, it dilates and prepares them for the Tan; they put a meaſure of this dung, containing 6 inches in height by 10 inches diameter, to every 12 Hides; it coſts about 16 or 18 *French* ſols (of *Paris*) a buſhel *Engliſh* meaſure.

Among Mr. *Deſbilettes'* papers, written in 1665, I found a method of preparing Hides, which is remarkable, and abſolutely forgotten in *France*, but not in *England*. Take, ſays he, freſh water ſufficient to ſteep your number of Hides, add from 4 to 6 * boiſſeaux (each boiſſeau 661 $\frac{7}{10}$ cubic inches) of *green broom* minced ſmall, or even of *green fern*; of dogs dung, pigeons dung, and henhouſe dung; let all be mixed together, ſtirring them up; let them ſoak together for forty-eight hours, then let the Hides be all put in together for forty-eight hours, after which they are beamed on the grain ſide, then having made a liquor of grain, and ſome of theſe ingredients well beat and bruiſed ; ſteep the Hides during twenty-four hours, and ſtir them about well at the beginning.

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* A boiſſeau is the *French* Buſhel, about a peck and half of *Engliſh* meaſure. Twelve boiſſeaux make a ſeptier.

This liquor of grain is ſometimes made with hot water, ſcattering ſome of the drugs on the Hides, of which we ſhall ſpeak hereafter ; or ſome other ingredients, ſuch as the tops or branches of oak, cheſnut, birch, or the ſhrubs themſelves of three or four years old, well dried and ground.

I found alſo among Mr. *Deſbilletes'* Memoirs, that Colonel *Doughty* had brought from *England* forty-five years before that, a ſecret which he ſaid was of his own invention. This ſecret was practiſed at *Paris* and at *Châtelleraud*, by a Company who had the King's Patent for this Art of Tanning throughout *France*. This ſecret conſiſted in what they called a * Confit, and is thus made : Take Broom in the ſpring at a dry ſeaſon, while it is green at foot, from the month of *March* to the beginning of *June*, or even in the ſecond ſeaſon, from the month of *Auguſt* to the month of *November*, but the ſpring is beſt ; the pointed broom may alſo be uſed, but it is not ſo good as the green broom. This being dried and laid up in a dry place, is then bruiſed in a Tan-mill, or in a Mortar, or cut ſmall by hand. When a hogſhead full is prepared, empty it into a vat, on which pour clean freſh water, ſufficient to cover 20 dozen of Calves Skins ; let the broom be ſteeped four days, adding a little dung of dogs, hens or pigeons, until the water becomes reddiſh and ſtrong; pour the liquor through a wicker baſket to ſeparate the broom, take half a * boiſſeau of quick Lime, ſlack it, and mix it with clean water apart, then run it into the broom liquor, mix all well together, and throw in the Skins; they muſt be taken out every two days, and when out, ſtir about the Lime; continue this for ſeven or eight days in ſummer, longer in winter, after which they are to be *fleſhed*. Being *fleſhed*, replace them in the *Confit* eight days longer, after which they are taken out to be grained; in fine, they are put a third time into this confit liquor, and are then fleſhed a ſecond time, after which they are cleanſed and put into the Tan Vat.

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* The *Engliſh* call this Maſterings.

To make this Tan Vat for 10 dozen of Skins, add hot water about two-thirds full, throw in half a Muid of Tan; let the Skins remain there eight days; the firſt day ſtir them, placing the upper ones undermoſt, and *vice verſa* for two or three hours; the ſecond and third days they are not ſtirred about, but are taken out and laid on a plank for ſome hours; they then are left in the Tan Vat for ſome days.

After the firſt eight days of Tanning, the Skins are put into a ſecond liquor, prepared three days before; in this Manner, take a Muid and a half of Tan, put one half into the water, lay in 4 or 5 Skins, cover them with a bed of Tan, and ſo on alternately; the Skins remain one month in this liquor. We may, ſays Mr. *Deſbilletes*, put into this Vat powder of Bittany, of Raphanus Marinus, of White-pepper, of Sumach, of Gall-nuts, or of Ginger; they give a firmneſs and a grain.

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* This meaſure has been already explained.

At the end of a month, the Skins are put into another Vat, compoſed of the ſame kind of liquor, but weaker; the Skins are taken out every day, and are immediately put in again, leſt they be ſtained or ſpotted; at the end of three days they are put into ſtronger water, with Tan laid between each Skin; this ſtrong liquor is changed two or three times, until the Skins be completely tanned, which commonly require a month; they then hung in the ſhade to dry.

Cow hides being ſtronger than Calve Skins, require double the time; and in winter from *September* to *March*, all the intervals before-mentioned muſt be doubled. Obſerve that Broom mixt with the Lime to peel off the hair, diminiſhes the corroſive quantity of the Lime.

Ox-hides require a ſtronger liquor than any others, and more aſtringent ingredients; Birch Trees of three or four years old muſt be uſed, or the ſmall branches of Birch or Cheſnut; the Birch makes the beſt leather; it is ſtill beſt if the rind of oak be mixed with the Birch, but they need not be ground ſo ſmall or ſo fine, for groſs Hides, as for Calve Skins or Cow Hides.

Of the Effect, and of the Danger of Lime.

We have ſhewn that Hides muſt be wrought in Lime one whole year; in order to raiſe them, make them thin and tender, without the riſk of putrefaction; the Lime Water dilates them in effect, but at the ſame time eats and corrodes them; it produces in the ſpace of one year, what might be obtained in one month by other means. Lime renders the Leather ſtiff, hard, and brittle; when this Leather is wrought into Shoes, it ſoaks the wet, and is very difficult to be dried; it relaxes again in wet, and extends itſelf like a ſponge.

Before the Reputation of *Engliſh* Hides, and thoſe of *Liege*, *France* ſupplied great part of *Europe*, and it was a very advantageous trade; the old people yet remember this trade in great proſperity; to what cauſe then is this ſudden change owing? The uſe of Lime is undoubtedly the reaſon that this valuable Manufactory is brought to diſcredit in *France*, and the *French* alone ſtill perſiſt in this pernicious method; Lime is corroſive; it burns the Hides to that degree, they often tear or break in the handling and fleſhing.

When the Hide is burnt by the Lime, Tan, which is only an aſtringent and a dryer, by no means repairs the fibres already half deſtroyed; it can only ſtrengthen thoſe which remain unhurt, by expelling that moiſture which relaxes and diſpoſes the Hide to corruption. The *Engliſh* dreſs their Hides with Barley and Ouſe, without the aſſiſtance of Lime; it is only by imitating them we can recover that trade and its balance, which is entirely in their favour at preſent.

All Tanners are ſenſible that Lime damages the Hide; for this reaſon, the Hide is always watered when taken out of the pit, and in ſome places the Lime-pit is ſo far ſpent and ſo old, as to require a long time to take effect.

I know but of one ſort of Leather where Lime makes the whole preparation, and that is for Circles of Spectacles, Snuff-boxes, and ſuch like things. This Leather in the Hide is like a large ſheet of thick Parchment. A Hide of this kind which weighed 80 pounds in the hair, coſts in *France* about 50 livres.

Of Bark and Tan Pits.

The Hides being raiſed by the Lime-water, and having undergone a fermentation, which has dilated the texture and ſpread the fibres, and being deprived of that natural Gum which abſorbs moiſture, are then in a ſtate fit to be tanned, that is, to have their fibres ſtrengthened and reunited.

Tan is therefore only an aſtringent and drying powder, by which leather acquires a neceſſary ſtrength and durability; the Bark of young Oaks are commonly uſed to make Tan.

The young Oaks are peeled of their Bark at that ſeaſon when the buds begin to open, and the ſap to riſe, the bark is then moſt eaſily peeled off the trunk and branches. This ſeaſon is about the middle of *April*, earlier or later according to the temperature of the year, and the ſituation of the place.

By the King's Regulations, no Royal Foreſt can be barked while the Tree is ſtanding; it is true, that when the Tree is barked and left to the time of next Sap riſing, the Trunk is damaged, and one half of the Sap, at leaſt, is loſt to the produce of the Tree; yet when the Tree is cut down immediately after having barked it, the Trunk receives no injury, and the Root will ſhoot out afreſh.

The wood thus deprived of its bark is only fit for fuel, and is alſo much inferior to new wood in the bark, for it burns quicker, it blazes much, and heats leſs, as it is full of chinks and flaws, and is much drier.

Bark is compoſed of certain veſſels conſpicuous to the eye, which contain the reſinous aſtringent quality of the tree; theſe are chiefly in the middle rind; the exterior coat is commonly dry, dead, and earthy, and the inſide coat contains the ligneous or woody fibres.

The beſt Bark for Tan is white on the outſide before it is ground, reddiſh within, rough and dry on the inſide, brittle and of a fleſh colour, ſmells of the ſap within, and keeping that ſmell when it is ground; that which is cut and made up in bundles, is preferable to that which is folded.

In *France* we think Bark ſhould be taken from young Oaks, from ten to twenty years growth, at moſt at thirty years. We reject ſuch Bark as ſhews its great age by the cracks and crevices on the outſide, or ſuch as is taken too near the root; when black within, it proves it is too old, or that it has ſuffered by rain; if too red within, or has loſt its ſmell, it is a ſign it has loſt its quality alſo.

Ground Bark is eſteemed bad when too red; if it is foul or dirty; and if it appears ſtringy, or thready like hemp.

The Grinder or Miller ſhould obſerve that all is equally ground and broken; for if any ſhould be flattened or ſqueezed, and not broken, it can only produce part of its tanning quality.

The price of Bark differs in the ſeveral Provinces, as there is a ſcarcity or plenty of wood; in *Lyonnois* and *Breſſe*, it coſts 3 livres the hundred in powder, or thereabouts; the Grinders have 8 ſols for grinding a ſack of 130 pounds.

About *Paris*, it is ſold in parcels, a *Cavalee* contains five parcels, each parcel is five feet long, and about the ſame in circumference; if it is ten or twelve years old, the *Cavalee* is worth 15 or 16 livres; but from ſixteen to ſeventeen years old, it is not worth more than 12 livres; not becauſe it produces leſs, but they ſay, the old has not the ſame ſtrength, age rendering it leſs penetrating. Each parcel yields about 5 boiſſeaux of powder, and the boiſſeau weighs about 30 pounds, ſo that reduces the price of the powder to 48 or 50 ſols the quintal; it is yet cheaper in ſome places.

Some Merchants ſell by a meaſure called the Muid; each Muid containing from 104 to 124 Bottes or Bundles, and that quantity coſts from 7 to 8 livres grinding in the Mill. Some years the manufactory at *St. Germain* employs (in its 200 pits) 6 or 8 thouſand Poinçons of Tan, each Poinçon containing 216 *Paris* pints; they pay ſometimes 7 livres a Poinçon, which yields 200 pounds weight in powder, but the uſual price is 3 livres 10 ſols; it is uſed half beaten or powdered, inſtead of being ground in a Mill. Cow Hides for ſecond ſoals require a finer Tan, ſuch as brought from *Burgundy*, but the great diſtance makes this dear at *Paris*.

At *Nantes* the Bark is bought by the 100 fagots, each fagot at 20 ſols, weighing 45 pounds, and the Bark when ground, ſtands them in 50 ſols the Quintal. At *Rennes* they ſell it in powder, at a crown a Barrel, weighing 50 pounds, which is 45 ſols the Quintal.

The Tanners of *Beſançon* require permiſſion to fell their Trees to the 15th of *May*, contrary to the Foreſt laws, which require them to be felled before the 15th of *April*; they ſay, the ſap is more retarded in that Province than in any other, on account of the coldneſs of the climate, and there may be ſome reaſon in this, as I have before obſerved.

About *Gray*, in *Franche Comte*, they complain of the conſumption of wood, made by the great number of Forges, and that they can get no Bark but of ten or twelve years old, which they ſay is too young to produce good Bark; this agrees with the opinion of the Engliſh, who uſe Bark of a longer growth.

In *Orleans*, the Rangers and Foreſters have prevented the barking of Trees, and the Tanners are obliged to fetch it in powder from the neighbouring Provinces; theſe precautions are abſolutely neceſſary at certain times.

In *Dauphiny* Bark is ſo plenty, that they ſend much to other Provinces; but this is ſeldom the caſe in any other part of *France*.

Some Countries cut the Bark in Mills, by two poſts ſhod with iron, falling alternately upon it; theſe Mills are ſometimes worked by water, ſometimes by a horſe; others bruiſe it by a ſtone turning round, but ſome think this heats the Bark, and cauſes it to throw out ſome of its fire and weakens it: in fine, ſome Tanners cut it by hand, as thoſe of *Britanny*, and yet the Bark coſts no more than in other places; it ſeldom exceeds 50 ſols the quintal.

In *England* they uſe the Bark of the oldeſt Trees, as well as that of young ſhoots; they bruiſe it with a Stone Mill, like a Cyder Mill, only the Stone is not quite ſo large, and it is channelled to have the greater effect in cutting the Bark. The Bark of old Trees is very ſubject to be dead, dry, and moſſy, it muſt be carefully *ſcutched*, in order to take off the black and groſs covering, which envelopes the red and live Bark.

Some Tanners build their own Mills; in *Provence* they erect one for about 200 livres, and the expence of a man and horſe by the year, amounts to 5 or 600 livres.

Bark reduced to Powder muſt not be kept long; it loſes its ſtrength by evaporation, which carries off its balſamic particles, it alſo ſpoils by the moiſtneſs of the air, which diſſolves the active and ſaline particles which ſhould penetrate the Leather to produce a good Tannage.

Of different Subſtances which will tan Leather.

The dry and aſtringent quality of Oak Bark is found in many other plants, and although the Bark of Oak is the beſt and moſt common; I cannot avoid mentioning other materials which may be ſubſtituted.

I have heard it ſaid, that in *Martinico* they tan Leather in ſix weeks, with the *Mangle* or Mango Tree.

Some of the *Calmouc* Tartars who live near the great wall of *China*, tan Kid Skins with ſour Mares Milk.

In many places in *Turkey*, as well as with us, *Morocco* Leather is tanned with Gall Nuts.

In *Perſia*, in *Egypt*, and in many parts of *Africa*, they tan Goat and Kid Skins, with the aſtringent leguminous Shrub, called *Acacia-vera*, gathered unripe.

The Nuts (Cones) of the Turpentine Tree, while green, and ſome ſay the Leaves alſo, as well as thoſe of the Maſtick Tree, are uſed in the *Levant*.

Sumac, *Rhus*, or *Smak*, is every where uſed for that Leather called *Cordouan* (made of Goat Skins) the *Arbutus* alſo is proper for this, as alſo the *Lote* or *Nettle Tree* (*Miſcokier ou Celtis.*)

The *Tamariſcus*, the *Rhamnus*, the *Rhus myrtifolia* is uſed in many Provinces of *Italy* and *Spain*; we ſhall ſpeak of them hereafter. In *Sweedland* they uſe the bark of the ſmalleſt mountain Sallow or Willow, as alſo of the plant called *Uva Urſi.*

In *Sileſia* they uſe a ſpecies of Myrtle called *Rauſch.* The Bark of Birch is employed inſtead of Oak in divers Provinces of *Germany.* In *Sweedland* they uſe another ſhrub called *Buxerolle,* in Latin *Arbutus uva urſi.* At *Vienna* and in *Hungary,* they never uſe Oak Bark, but a drug they call *Knoupren,* and which I believe to be Gall Nut: This is the quickeſt and moſt durable tan known; it may be kept nine months without loſing its virtue; very little of it goes to a pit, as they only ſcatter a ſmall quantity on each Hide with their hands. A Cow Hide may be tanned with this in twenty-four hours.

I know not what method the *Chineſe* follow, but their Hides are incredibly ſtrong.

When the Tanners of *Provence* and *Languedoc* are preſſed in point of time, they mix Powder of *Redoul* with their Bark; this apparently gives a firmneſs to the Leather, by which the Buyer is impoſed on. This Plant is called by *Bauhini, Rhus myrtifolia monſpeliaca,* and by *Linnæus, Coriaria* (myrtifolia) *foliis ovato-oblongis trinerviis;* it is alſo called *Roudou,* and is deſcribed in the Memoirs of ths Academy of *Paris,* for the year 1711. The Berries of this Plant cauſes an Epilepſy, ſometimes mortal, if eaten by the human Species; its Leaves eaten by Kids cauſes violent Vertigos, but it does no miſchief in the Tan Vat, and coſts much leſs than the Bark of the Baſtard *French* Oak. The Branches and Stalks of the

Redoul ſerves well enough for Baſils and Goat Skins, for upper Leather of Shoes.

The Plant called in *Provence*, *Garouille*, at *Mountpellier*, *Avaüſſes* or *Avau*, has been deſcribed by Mr. *Niſſole*, under the word *Kermes* (or Scarlet Berries, being the Fruit of the Scarlet Oak); it is named by Botaniſts, *Quercus*, (coccifera) *foliis ovatis indiviſis ſpinoſo-dentatis glabris*: Linnæi Specierum, p. 995. *Ilex acculeata cocciglandifera* C. Bauhini Pin. p. 425. *Quercus, foliis ovatis dentato-ſpinoſis, glandibus ſeſſilibus*, according to *Sauvage*, p. 96.

The *Kermes* or Berries which renders this Shrub remarkable, is an excreſcence cauſed by the depoſit of inſects eggs; there is an ample deſcription of it in the Memoirs of the Academy for 1714, by Monſieur *Niſſole*. He calls it in Latin *Coccus Ilicis*: the Syrop of Kermes, and the Confection Alkermes are compoſed of it.

It is only the Bark of the Root of this Plant which is uſed in Tanning, whereas it is the Bark of the Oak Tree itſelf makes the common Tan. This Bark of the *Garouille* or *Kermes*, cauſes a blackneſs in the Leather, whereas Oak Tan makes it red. The common name of the Bark of the *Garouille* among Tanners is *Ruſque*.

This *Ruſque* coſts more than the common Bark; it burns the Hide more than Bark of Green Oak, but it tans in ſix months; and though it cauſes that blackneſs in the Hide, they ſay, it is as good as the green Oak Bark, but it is only a deceit in Trade, for certainly there is no ſubſtitute ſo good.

There are many provinces in *France* uſe the green oak, of which there are two kinds indiſtinctly uſed at *Montpellier*, either for ſole or upper leather.

1. *Quercus* (ſmilax) *foliis oblongo-ovatis ſubtus tomentoſis integerrimis.* Linnæi Specierum. *Ilex folio auguſto non ſerrato.* Caſp. Bauhini. Euze. Green Oak, or Jeuze.—2. *Quercus* (Ilex) *foliis ovato-oblongis, indiviſis-ſerratiſque cortice integro.* Linnæi Specierum.

This Bark is ground and uſed unmixed; it is a principal article of commerce about *Montpellier*, and is ſold from 50 ſols to 3 livres the quintal. Strong hides and ſole remain a year in this bark as in that of common oak, but upper leather remains but two months.

In the new manufactory ſpoken of by Mr. *Deſbilletes*, inſtead of oak bark, they uſe the ſmall twigs of the branches of oaks, or young ſhoots of three or four years growth, becauſe they yield more juice than the bark; they are gathered a little before the leaves put forth, that is, in the month of *April*, or ſomewhat earlier according to the ſeaſon.

They uſe another preparing liquor made of oranges and lemons though ever ſo rotten, or either ſeparately, grinding rind, pulp, and core together; this makes the beſt leather, and cauſes it to take the tan quicker; the hides are left in this liquor eight days, ſtirring them often before they are tanned.

Many other plants are alſo uſed, and Mr. *Deſbilletes* obſerves, when they are gathered, if they cannot be dried in the ſun, they muſt be dried in an oven, as they are to be ground as bark; if they are not thus dried, a vicious juice will remain which will hurt and blacken the leather.

He adds, that as theſe plants have not ſo much ſtrength as the common bark, there muſt be a greater quantity uſed, but he aſſures us, that by theſe plants the fineſt and beſt leather may be made.

Cow hides and calf-ſkins may be tanned with a liquor made of all ſorts of heaths, brambles, black thorns, wild plumbs, and barberry trees, which muſt be cut, dried, and pounded; this liquor, adds he, tans the hides without corroding them, and in fine, we may uſe even the dog brier, and finiſh with *ſumac*; but it appears to me impoſſible to collect a ſufficient quantity of any of theſe to furniſh a tannery of any ſize.

Mr. *Deſbilletes* ſays, that to harden the leather, they put powder of the *raphanus marinus*, or elſe gall nuts (noix de galle is alſo an oak apple) and it is ſcattered on both ſides of the hide when it is about a quarter tanned, four hours after it is laid in the pit; a ſecond operation of the ſame kind ſucceeds before the hide is perfectly tanned, if it appears not firm and ſmooth: this method, adds he, makes the beſt and fineſt of leather.

Mr. *de Buffon* declares that the cup of acorns will tan, and alſo oak ſaw-duſt. This celebrated man's obſervations on foreſt trees and every quality relating to them are diſperſed in many volumes of our memoirs.

It has been often mentioned by writers, that *Europe* will one day be in want of timber, and this opinion proceeds from the immenſe quantity daily called for in buildings and the mechanic arts; there are ſome places where it is already ſo dear, that the inhabitants actually burn it by weight and meaſure; where they cannot afford to work it up into veſſels or caſks, and are obliged to uſe the ſkins of beaſts in lieu thereof; where manufactures moſt *intereſting* to the ſtate, cannot be eſtabliſhed, becauſe of the great conſumption of this uſeful article. And there may come a time when the moſt poliſhed and polite nations ſhall return to a ſtate of ignorance and poverty, for want of timber, on which ſo many uſeful arts depend.

Mr. *Gleſditſch*, a celebrated Botaniſt of *Berlin*, has with many other Naturaliſts, formed a ſcheme to ſave the conſumption of oak to the *German* ſtates. In the Memoirs of *Berlin* for 1754, he gives inſtructions for the uſe of plants, that will tan inſtead of oak bark: On the hints given by Mr. *Klein*, a moſt laborious and ingenious man, he made ſeveral experiments, they ſucceeded, and he acknowledges the ideas of Mr. *Klein* as a real and valuable diſcovery. Leather was produced, prepared, and tanned without the aſſiſtance of any kind of tree, or foreign drugs; excellent goat ſkins were prepared without ſumac, and two ſorts of calve ſkins tanned with the ſimple leaves of trees.

Theſe gentlemen uſed thoſe plants which are common in moſt marſhy ſoft ſoils; ſuch as are in general refuſed by animals as food, and which nature ſeems to intend purely as ornamental; in ſhort, ſuch as are generally found in ſolitary and inacceſſible places.

Such plants as are fit for this purpoſe, as do not contain terreſtrial, reſinous, and gummy particles, but have oily and vaporous particles; Mr. *Gleſditſh* divides them into theſe two claſſes accordingly.

The firſt claſs are aſtringents ſharp, and without ſmell; which have active but fixt principles; the earthy parts are about one third, and ſometimes one half, the gummy parts about as much; the reſinous parts are the leaſt, not being in general above one drachm in a pound.

The ſecond claſs are thoſe which have volatile particles; a ſpirituous principle, partly balſamic, and partly unctuous, and have fewer fixed particles; but of all theſe plants, the beſt for tanning are thoſe which are chiefly compoſed of a groſs, aſtringent, acid ſubſtance; the fat and mucilaginous are the worſt.

When the fixed ſubſtance of theſe tanning plants is deſtroyed by fire, a pelucid and non-aſtringent empyreumatic phlegm is obtained; an acid yellow liquor with an empyreumatic oil. The *caput mortuum* often makes half of the whole, and contains ſome portion of fixt alkaline ſalt.

All plants fit ſor tanning being reduced to powder and thrown into a ſolution of iron, with oil of vitriol, ſhould produce a reddiſh blue or blackiſh colour.

By knowing the contents of the principles of theſe plants, Mr. *Gleſditſch* was led to pronounce the effects they will produce on leather: The acid, being diſſolved and mixed with water, and put into motion with the volatile, oily, and balſamic particles, penetrates and condenſes the ſkin, gives it ſtrength and preſerves it from corruption.

Plants require no mill-work, it being ſufficient they ſhould be groſsly cut or pounded. Yet I muſt confeſs my opinion, that of all this multitude of plants which may tan, there are none do it ſo effectually as oak bark, I doubt even if a ſufficient quantity of them could be obtained in the ſame abundance; however I ſhall give a catalogue of them from Mr. *Gleſditch*.

Plants whoſe leaves, branches, fruit, ſeed and ſometimes their roots may be uſed in tanning.

Vine branches.

Prunus Sylveſtris (Wild thorny Plumb) the bark and fruit before ripe.

Salix vulgaris olba (Sally) the branches and leaves.

Salix caprea rotundifolia Tabernæ (Water Sally) the leaves, bark, and branches.

Sorbus aucuparia (the Service Tree) the branches, leaves, and fruit, when green.

Leaves of the Roſe Tree.

Fagus (the Beech Tree) the leaves and bark.

Carpinus (the common Hornbeamed Tree) the branches, leaves, and bark.

Oak leaves.

Alder Tree, the leaves.

Meſpilus, (the Wild Medlar;) the leaves, branches, and unripe fruit.

Ledum Roſmarini folio Tabernæ, *Roſmarinum ſylveſtre*, (Wild Roſemary) the branches. This plant is not common.

Cornus ſylveſtris mas, (Cornel Tree) the leaves, branches, and ſeed.

Acetoſa pratenſis, (Wild Sorrel) the root and ſeed.

Lapathum maximum aquaticum, (Great Water Dock) the leaves, roots, and ſeed.

Lapathum folia acuto plano, (Water Dock) the leaves and ſeed.

Iris paluſtris lutea, ſeu acorus vulterinus, (Aquatick Flower de-Luce,) the root.

Nymphæa lutea, (white and yellow Water Lilly) the roots only.

The bark of Cheſnut, Poplar, and Hazle Tree may alſo be uſed.

Plants whoſe flowers only; or the leaves with the flowers, may be uſed in Tanning.

Salicaria vulgaris purpurea foliis oblongis; ſive Lyſimachia ſpicata purpurea forte Plinio; (Purple-ſpiked Willow-herb, or Loſeſtriſe.)

Ulmaria, (Meadow-ſweet.)

Quinquefolium paluſtre rubrum, (red aquatick Cinquefoil.)

Felix ramoſa major pinnulis obtuſis non dentatis, (Female Fern.)

Filix non ramoſa dentata, (Male Fern.)

Filix paluſtris maxima, (great aquatick Fern.)

Filix mas aculeata major & minor, (the greater and leſs ſharp Fern.)

Perſicaria ſalicis folio potamogeton auguſtifolium dicta, ſive Perſicaria acida Jungermanni, (Arſmart) they grow both out and in the water, but ſomewhat different in their ſhape.

Biſtorta major radice intorta, (Biſtort or Snakeweed.)

Tormentilla Sylveſtris, (Tormentil.)

Pimpinella ſanguiſorba major, (Burnet.)

Cariophyllata vulgaris, (common Avens.)

Caryophyllata aquatica nutante flore, (aquatick Avens.)

Argentina, ſive *Potentilla*, ſive *Anſerina officinarum*, (Wild Tanſey.)

Quinquefolium majus repens, (the greater Cinquefoil.)

Quinquefolium minus repens luteum, (leſſer Cinquefoil.)

Quinquefolium folio argenteo, (white Cinquefoil.)

Horminum pratenſe foliis ſerratis; ſive, *Sclarea Tabernæ montani*, (wild Clary.)

Agrimonia, (Agrimony.)

Equiſetum arvenſe longioribus ſetis, (Field Horſe-tail.)

Equiſetum paluſtre longioribus ſetis, (aquatick Horſe-tail.)

Alchimilla vulgaris, (common Ladies-mantle.)

Muſcus pulmonarius, ſive *pulmonaria officinarum*, (Lung-wort.)

Muſcus quernus, (Oak moſs or Oak lungs.)

Lyſimachia lutea major, quæ Dioſcoridis, (Looſeſtrife.)

Vaccinium Rivini, Vitis idæa foliis oblongis crenatis

natis fructu nigricante, (Black Whorts, Whortleberries, or Bil-berry.)

Vaccinium foliis buxi, ſemper virens, baccis rubris, (Whortle-berry.)

Rubus vulgaris ſeu fructu nigro, (the common Bramble.)

Rubus repens fructu cæſio, (leſſer Bramble.)

Fragaria vulgaris, (common wood Strawberry.)

Filipendula, (Dropwort.)

Pervinca Tragi & Tournefortii. Clematis daphnoides, (Periwinkle.)

Sparganium, (Bur-reed)

Filago, ſeu impia, Dodonæi, (common Cudweed.)

Gnaphalium montanum flore rotundiore & longiore, (mountain Cudweed.)

Geranium ſanguineum maximo flore, (bloody Cranes-bill with a large flower.)

Geranium batrachiodes maximum minus laciniatum folio aconiti, (mountain Cranes-bill with a crowfoot leaf.)

Plantago, (Plaintain:) all ſpecies are good.

Hypericum officinarum, (common St. John's wort.)

Of the Pit work.

The pits are cavities made in the ground, in which the hides are laid with the tan; theſe pits are either round or ſquare, made with timber or maſons work: they were formerly lined with wood, and their figure ſquare, which ſeemed more proportionable to the ſhape of the hide; they are now in *France* commonly made of a round form, like unto vats, made after the ſame manner with ſlight timber and hoops; ſome make the bottom larger than the top, that they may reſiſt the earth the more.

Before the hides are pitted, ſome ſprinkle their bark with water, and ſtir it about with a ſhovel, that it may not be blown away, but the powder is more equally divided when dry.

The hides being raiſed, fleſhed, watered and drained, are fitted to be pitted, with the bark which is to ſtrengthen and tan them.

In *Auvergne* they divide the hide in three parts before it is laid in the pit; the middle part, or the ſtrip of the back is about a foot broad, ſome even cut that into two equal parts.

The hides are ſprinkled with bark, and piled for three or four hours, that they may take the fire of the bark before they are laid in the pit.

The bottom of the pit is covered with bark which has been uſed, ſix inches thick; over this is laid freſh well ground bark one inch thick, being a little wetted; on this powder the hide is laid, over this another lay of powder, and thus alternately.

Some cut off the forepart of the heads of the hides, and lay them ſeparately, to give them more bark on account of their thickneſs; ſometimes the hides are cut acroſs each half, that they may lay the better on the tan; the extremities of the hides that are wrinkled or bagged muſt be ſlit, that they may the better be extended; bark is put between each part of every hide, and when it is folded, bark is alſo put in the folds; adding more on the thickeſt parts; the thickneſs of a finger is ſufficient for the thinneſt parts. A diſtinction is to be made between the three powders as to the thickneſs and quantity of bark: the firſt put into the pit, muſt be ſomewhat more than an inch, the ſecond one inch, and the third ſomewhat leſs.

Some are of opinion that the tanning ought not to be done with fine powdered bark, but groſs, that is a degree above powder, for the firſt bark; in the ſecond a little groſſer, and the third ſtill more: it appears to me, that the only advantage of this method is a ſaving of expence; for the finer the bark is, the more is conſumed, it penetrates the hides better, the ſooner it waſtes itſelf; and the more the hides profit by it; therefore I think this method ought to be exploded.

At *Bâle* they tan with groſſer bark than in *France*, and in moiſter pits. In *England*, they tan in water itſelf, as I ſhall hereafter ſhew; but at preſent I am treating of the general method followed in *France*.

All vacancies or hollows in the pits not filled with hides, muſt be filled with old bark to ſave the new; in order to make fewer ſpaces, the hides or the halves if they are cut acroſs each other. Each hide when laid in the pit is well trampled with the feet, that it may lay cloſer on the bark: the more compact the hides the ſooner the bark will penetrate.

It requires about two hours to fill a pit of fifteen or ſixteen hides, after the manner I have deſcribed: when the pit is nearly full, and the laſt hide is covered with new bark, a foot or two of old tan is well ſtampt on the whole to make a covering; boards are placed over them, and ſtones over the boards, to preſs all together, and to cauſe the bark to penetrate the better.

The pit being thus covered, clear water is poured into it in ſuch a quantity that in the ſpace of a day it may not be thoroughly ſoaked up, and that next day ſome may appear on the ſurface: it requires for every two hides a pail of water containing three cubic feet or about one hundred pints of *Paris*. In ſome places they are much oftner watered, and they ſound them from time to time to know whether they are not too dry.

Hides are tanned with three barkings; the firſt barking is on the grain; it muſt be fine, to prevent their wrinkling and becoming uneven; this firſt barking continues three months.

The ſecond is given on the fleſh ſide, but not ſo fine as the firſt; this ought to continue four months, for in leſs time they will not be tanned in the middle of their ſubſtance.

The third barking is on the grain; and in groſſer powder than the ſecond: this continues five months, which compleats the year; the tannage has now produced its utmoſt effect. Sometimes for greater perfection a fourth barking is given, and then the hides may be left longer if thought neceſſary.

Each time the bark is changed, the hide is ſwept, beaten, and ſhaken, that the old bark may not prevent the freſh from caſting its fire into the hide.

Thoſe that tan great quantities may fill their pits with hides of the ſame degree of tanning; that is, one entire pit may ſerve for the firſt barking; another whole pit for the ſecond, &c. But this is impracticable with thoſe who have not ſuch quantities; they are under a neceſſity of putting part into the ſame pit hides of a firſt, ſecond and third barking; obſerving to place at the bottom thoſe of the laſt degree that are moſt advanced in tanning, and ſo on with the reſt, to thoſe of the firſt barking, which fill the upper part of the pit, and are reſerved to go down in their turn.

But as the water which is poured on the bark, always ſubſides to the bottom of the pit, and carries with it the moſt active part of the bark, ſo at the bottom the hides are moſt forwarded; and for that reaſon, when in a pit where all the hides are of the firſt barking, and they intend to lay a ſecond barking in the ſame, they place thoſe at the bottom which were at the top, that all may at length be equally tanned.

This moiſture ſo eſſential to the buſineſs, and which ought ſtill to be increaſed, is ſometimes deficient by the leaking of the pit; the hides then remain almoſt dry, which prevents the tan from having its deſired effect; and as it is of the greateſt importance that the pits ſhould be ſtaunch, they ſhould be frequently ſounded and tried. Yet they muſt not be opened without neceſſity, for the air, ſun, froſt and wind retard the operation of the tan.

The quantity of bark varies according to its quality: the account we received from *Languedoc* allows four times the weight of the hides; that is, two hundred pounds of bark is given for a hide that weighs fifty pounds: which is ſomewhat more than is uſed in and about *Paris*.

At *Sedan*, the three barkings conſiſt of 85, 75 and 65 pounds, that is 225 in the whole, for one hide which when green weighed 100 pounds, and when dry 50.

In *Breſſe*, where ox-hides when finiſhed, and fit for ſale weigh commonly twenty-three pounds, they ſeldom uſe more than thirty or forty pounds of bark at the firſt barking of each hide; the others in proportion.

Hides raiſed or ſwelled by barley, generally require about a fifth more bark than thoſe raiſed by lime.

At *Sedan*, for a hide prepared in four-liquor, (that is, with barley,) and weighing green one hundred weight, they allow eighty-five pounds for the firſt barking, ſeventy-five for the ſecond, and ſixty-five for the laſt, as we have before deſcribed: Yet ſome tanners ſay, that hides prepared with lime require a fourth barking, that is, three or four months longer in pit than hides raiſed by barley; this probably happens from the red workings or binder given to hides filled with barley, which diſpoſes them ſooner to receive the ſaline particles of the bark.

In tanneries where hides are prepared with liquor of bark (or ouze) the firſt barking is ground very fine, becauſe it is not to be uſed out of the pit: the two other powders (which when taken out of the pit, are to be made uſe of for ſcouring liquors) are groſsly ground; yet the tanning would be more perfect if the bark was equally fine.

I have already obſerved that when the tanning is only carried on for the ſpace of one year, that the firſt pitting, or firſt barking continues three months; the ſecond four and the third five months. Experience has proved that hides are much better for being kept longer in the laſt barking than in the firſt; the reaſon is obvious; a hide newly laid, greedily and quickly ſucks up the nutritive ſubſtance of this bark, and when thus deprived of its active parts, its continuance on the hide would add no more to its quality; on the contrary, in the laſt barking the hide being already in ſome degree tanned, is more compact and hardened, and the tan requires a conſiderable time to inject its fire, and to diveſt itſelf of all its ſalts; the hide cannot be hurt in this ſtate, though it might in the firſt bark, where is was not yet ſufficiently tanned, to be ſecured from corruption, or the fermentation of the animal parts.

In *Burgundy* it was enacted, in 1349, that ox-hides ſhould be laid in three barkings of three months each, in order that the hides might be well tanned; cow-hides to have two barkings, the firſt of three months, and the ſecond of four.

In *Auvergne*, they give three barkings, of four, five and eight months. In ſome parts of *Languedoc*, they give but two barkings, each of half an inch thickneſs, which laſt ten months or one year. In *Champagne*, the tannage is continued fifteen or eighteen months, in ſome places it is conſiderably abridged: in *Limouſin* there are ſome who lay their hides but two months in pit; this is an abuſe worthy of the inſpection of the magiſtrates, and which has been forbidden by the laws of *France.*

Some hides neceſſarily require a fourth barking of forty pounds for three months, after the three common barkings, theſe are hides that are ſtubborn by nature, dry and poor, and thoſe which may have failed in the ſcowerings. On the contrary there are thin hides which require leſs bark than others.

When hides want thickneſs and firmneſs after the two firſt barkings, it is remedied by ſcattering half or three quarters of a pound of powdered alum among the laſt barkings, which is to be ſtrewed all over the pit: this was one of Mr. *Teybert*'s ſecrets; and if this commodity was ſufficiently common in *France*, it would be of great advantage to the tanners.

The Engliſh method of Tanning.

The pits uſed in *Lendon* are carefully lined with wood, ſo as not to let the water leak, and are kept conſtantly full: they put in at firſt, two baſkets of bark, that is about eighteen *Pariſian* buſhels to a pit of fifteen or ſixteen hides; but they add more at different intervals.

They firſt place the hides in a pit almoſt ſpent, where they remain one month; after this in a ſecond, third, and fourth, in which they continue three months: laſtly in a fifth pit, where they lie one month without being ſtirred: there are ciſterns or waſte wells, on the ſide of each pit, to prepare the firſt liquors, and to water the hides.

In the ſecond, third, and fourth pit, the hides are taken out every eight days, and caſt again with the addition of two baſkets of very fine bark, divided and diſtributed amongſt the hides, without folding them, but promiſcuouſly throwing them into the water, with bark over them.

At *London* the total of theſe operations is finiſhed in a year at fartheſt: if there ſhould be any hides more difficult to be tanned than others, they are ſuffered to remain longer; but I have been aſſured it never exceeds eighteen months or two years, though it is thought in *France* that the Engliſh tanners employ more time.

That one man may the eaſier manage a great number of pits, containing each twenty, thirty, or forty hides, more or leſs, the date of their being put in pit are marked on ſticks, and the number contained; theſe ſticks are afterwards put into the pit and conſulted occaſionally.

This method of tanning in *England* in bark liquor or ouze, (and not in bark almoſt dry as in *France*,) is perhaps the reaſon of the conſiderable advantage their hides are ſaid to have over ours:

the water which continually keeps the moſt penetrating and ſtyptic parts of the bark in the ſtate of ſolution, muſt penetrate the hides with more facility than powder or the mud of the bark, which is only ſpread over them: and I appeal to the experience which every tanner muſt have of the goodneſs of *Engliſh* hides, to be juſtified or condemned in my explanation. Arts have been ſo little ſtudied and known hitherto, that even the moſt poſitive facts are contradicted and rendered equivocal by ſelf-intereſted men, and I doubt not, ſome tanners will even aver that *Engliſh* hides are not better than the *French*.

Of the time required for Tannage in France.

Some tanners who appeared to me to be ſincere and more inſtructed in their profeſſion than others, agreed that hides ought to be left much longer in the bark than is commonly practiſed in *France*, and that thereby they would acquire more quality and ſtrength; ſeveral are alſo convinced that thoſe excellent hides from *Liege* and *England*, which paſs for the beſt in *Europe*, have remained three years or more: I have known ſome maintain that the preparation of a good hide in *England*, laſted ſometimes ſix years, and that formerly in *France* they took up that time.

Some nevertheleſs maintain, that even in that, there is an exceſs to be avoided, and a point of ſaturation, when a hide cannot avoid loſing by remaining in the pit: that there is a greeniſh colour to be perceived in the middle of the hide when cut, which would not remain had the hide been too much tanned; inſtead of this, which ought to ſhew in the midde of the cut, is found, a dry, hard, horny ſubſtance, which on one ſide is eaſily penetrated by wet, and on the other renders the hide very brittle.

If it be true that bark is ſubject to ſuch an inconveniency, it muſt be allowed that in the preſent practice the intereſt of the tanners will free us from this kind of bad leather; perhaps the deſire of haſtily finiſhing their work, has never permitted them to try the experiment; and they are too much preſſed to get in their ſtock. If there are hides from *Liege* which remain ſo long in pit, they are thoſe brought from the iſlands, which being of a quality different from ours, may require a longer time in the bark; but it is certain the method of tanning almoſt dry in *France*, is more tedious than that of tanning in liquor, which in *England* requires but one year.

Method of ſhortening the Tannage.

A method of ſhortening the tannage has been long wiſhed for and often tried; the profit thereby would be conſiderable, ſince on ſixty hides there is a loſs of ſeventy-two livres a year on the intereſt of the capital ſtock, and the ground each pit occupies is equally expenſive to the tanners, eſpecially at *Paris*, where the rent and coſt of a tannery is a conſiderable charge: here is an expedient that borders on the *Engliſh* method, and which might conſiderably abridge the tannage. It is known that the re-ſteepings forward the lyes, and that the liquor of the tan forms and perfects itſelf by being often repaſſed on the ſame dregs; a ciſtern or drain well might therefore be made with two boards at one corner of the pit, to introduce a pump: by this means the filtrated liquor from the tan might be pumped out when gathered in the ciſtern, two or three times a week if neceſſary, and returned into the pit: theſe repeated filtrations would be a ſure means to draw the ſubſtance out of the bark, to diſſolve all the ſalts, to imbibe and penetrate the hides therewith, to keep them always ſoft and open, till the tan had penetrated and ſoaked them properly: experience would ſoon teach at what time it would be proper to put an end to theſe filtrations and refillings, and it appears that much time would be gained by following this method.

I am ſure a conſiderable advantage might alſo be gained by heating the water of a pit; warm water diſſolves, ſoftens, and penetrates much better than cold: we have already ſufficient proof of this on ſmall ſkins.

I have heard that M. *Teybert* mixt powdered alum with the tan he put in his pits: there is no manner of doubt but that it would greatly contribute to the firmneſs and ſtrength of the hide; but this commodity is perhaps too coſtly in *France* to be uſed in tanning: if there was a ſubſtance as aſtringent and ſtyptic as alum, and at the ſame time as common as oak-bark, it would augment the ſtrength of the hide, and abridge the tedious operation of tanning.

Of Drying the Hides.

The hides having remained a ſufficient time in the pits, and being well tanned, are dried in the ſhade, without beating or ſweeping; for this purpoſe they are extended on poles, or elſe hung by the head on nails; and that the air may have a free acceſs on all parts, they are kept open by one or two ſticks, extending the belly of the hide: for this purpoſe a loft is erected with many openings in it, but ſcreened from the ſun and high winds.

When the hides whiten and become ſtiff, but not thoroughly dry, they are dreſſed; for this purpoſe they are extended on a clean floor, are rubbed with dry tan to take off the mouldineſs, and trampled, particularly on the fleſh ſide, to take off the inequalities, riſings, and ſwellings; they then are piled, obſerving to couple them head to head and tail to tail; and then croſſing each couple alternately, they are thus left for one day: if they are not of equal ſize, the ſmall ones being ſooneſt dried, are piled ſeparately.

The following day the hides are put on the perches, unleſs not ſufficiently dry; if not, they are hung up for three or four days longer: when almoſt dry they are preſſed for twenty-four hours, that is, they are covered with planks loaded with weights.

Thoſe hides that are puckered are malotted, that is, they are beaten with a mallet on a ſmooth block of wood: the beating helps to ſtiffen, to draw out and ſmooth them; ſome tanners beat all their hides.

Being thus dreſſed, preſſed, beaten, and almoſt dry, they are put into a cool place, and their ſituation changed from time to time for three weeks;

ſometimes they are piled, charged, or turned over; ſometimes ſpread like a fan by putting the back on the edges; at the end of three weeks or a month, they are dry and fit to be uſed.

Though the hide be well dried, it is the better for being long kept; it ſhould be one month in ſtore at leaſt, that all the active parts of the tan may finiſh their penetration; that all inteſtine motion may ceaſe, which might tend to its diſſolution, and prevent the duration of the leather.

Where hides are raiſed with lime they only ſweep or bruſh the grain ſide, leaving the tan that ſticks to the fleſh ſide, to nouriſh the hide when it is folded: they are not beaten or tied, but are folded in two, the grain outward. In *England* they do not beat them flat as in *France*.

Hides raiſed or filled with barley, require more beating: when they are almoſt dry, they are extended on a ſtone well fitted for that purpoſe, ſurrounded by ſeveral men; each being furniſhed with a wooden mallet, and ſtriking firmly to render them more compact and firm; inſtead of a beating ſtone ſome uſe a wooden block, each are equally good. Eight men can beat thirty hides in a day.

This dreſſing is of great ſervice to the hide, and there is a conſiderable difference between the goodneſs of a hide well beaten, and that which has not been beaten: ſhoemakers who value themſelves on the goodneſs of their work, beat their ſoles ſtrongly and for a conſiderable time.

The *Engliſh* tanners faſhion their hides in the drying loft after a particular manner, which anſwers pretty near the ſame for the goodneſs of the commodity: when the hides are extended on the poles, the grain being on the outſide, they take a little mallet, rounded and made of very hard wood, with which they ſtrike the internal parts of its ſurface with repeated ſtrokes throughout the whole; by this means they give it nigh the natural ſhape of a bullock, and under this form they are ſold. The ſame operation is repeated morning and night; and if the hides dry too quick, they are ſprinkled with a broom, by which means they compreſs and harden themſelves under the mallet.

Of the Texture of Hides and of their Quality.

Hides and all ſkins in general are compoſed of ſeveral lays of fibres, interwoven, in the form of a net, and which interſect in every direction; as I have obſerved in the art of making parchment: thus leather cut in all directions preſents the ſame aſpect, the ſame ſtrength, and appears with its even thread on all ſides; conſequently its reſiſtance is equal in length and in breadth.

Hides well tanned are of a long duration, and are not ſubject to corruption: ſhoemakers, have kept them for fifteen years, without their loſing any part of their good quality; but they muſt be preſerved from the inconveniency of moiſture as well as too much dryneſs.

Merchants who buy large quantity of hides for the fair of *Beaucaire*, or ſuch like places, wet their magazines from top to bottom, to preſerve the weight of the hides. Hides will even augment in weight by aſorbing the moiſture of the air: this happens chiefly to *Hungarian* hides, which contain a great deal of alum.

To know if a hide be well dreſſed by cutting it, obſerve whether the cut be ſhining, the nerve cloſe, if it is internally of the colour of a thorny gall-nut, or like the inſide of a nutmeg, or if it be marbled within. The cut ought principally to be made at the throat, back, or towards the buttocks; theſe are the places to form a right judgment, becauſe they are the moſt eſſential parts of the hide.

Thoſe that appear tarniſhed on the cut, greeniſh or black, the nerve open, ſpungious, and a black or whitiſh ſtreak in the middle, are ill-dreſſed. Thoſe that ſhew horny in the cut, that are ſtiff, dry, and give a certain clear ſound, have not been ſufficiently tanned.

The tanners ſay that hides too much tanned are open, ſpungy, and light, are burnt by the ſtrength of the tan, and appear all over of one brown colour on the cut; but this is rather to be attributed to the lime than to the tan.

The uſual method to know an ill dreſſed hide is this, let fall a drop of water from the finger on the grain, or rather on the cut; if the drop does not remain perfectly round, but extends itſelf, it is a proof that the hide is badly tanned and ſpungy; but a hide muſt be very bad and very ſpungy to abſorb a drop of water inſtantly. To diſtinguiſh it thoroughly, the hide ought to be ſteeped in water for ſome days, weighing it before, and at its being taken out of the water, one might then judge of its ſpungy quality by the augmentation of its weight, but it ſhould firſt be aſcertained how much water a hide of the beſt leather would ſuck up in eight days, or how much time it would require to abſorb one ounce weight of moiſture.

Of Hides raiſed or filled by Barley.

Having now deſcribed the moſt ancient and common method of tanning, I ſhall again take the work from its firſt operation, in order to explain the different methods made uſe of to attain the ſame end.

The firſt of the two great operations of the tanner formerly conſiſted in raiſing the hides, that is, to dilate and open their pores by the moiſture of lime-water, in order to facilitate the operation of the tan pit which was to follow: it has ſince been found that fermentation managed ſkilfully, and conducted with precaution, could produce the ſame effect in leſs time, and after a more perfect manner: this conſiſts in ſouring a paſte made of flour or barley, which is after diluted, and in which the hides are ſteeped: this ſour water cauſes an acid fermentation in the hides, which dilates and riſes them without burning or weakening them, as lime muſt.

This general method I ſhall divide into ſeveral branches, becauſe it is practiſed different ways, and ſhall lay down ſucceſſively all thoſe which have reached my knowledge; after which I ſhall treat of hides raiſed by oak liquor or ouze, which are prepared without barley flour, by means of a different fermentation.

Hides to be raiſed or filled by barley, are to be well waſhed from the blood if freſh; the ſalt taken out if dry and ſalted; they are to be ſoftened by ſteeping, fleſhing, and trampling, the ſame as hides filled by lime.

The river work muſt be well carried on for thoſe raiſed by barley; the water muſt come clear from them, and the gummy part be well preſſed out, as it would hinder the fermentation in the barley workings or ſcourings, by encloſing with its mucilage, the inſenſible parts, whoſe inteſtine motion produces fermentation. I know that the firſt experiments of an eminent tanner failed, becauſe of ſome glue that was in the vats he made uſe of.

When the hides are well ſoaked and ſoftened, they are to be filled by means of the acid fermentation. It is well known that flour diluted with water, ſuch as the common dough made for bread, is ſubject to ferment and grow ſour; that in this ſtate the dough riſes, ſwells, and heats; ſuch is the effect produced in the hides, by the means of barley diluted with water; this is called barley workings (or ſcourings:) it is done in common vats four feet in height and four feet diameter.

It requires about one hundred or a hundred and ten pounds of barley for a ſcouring of eight hides, ſuppoſing middling hides weighing twenty-five pounds dry, or fifty green: ſome put in all the flour at once, when they are going to work the hides; others make a leaven the day before with twenty-five pounds of flour and a caldron of warm water, and add the remainder of the flour twelve hours after; ſome add a ſmall quantity of vinegar to accelerate the fermentation: three or four quarts of vinegar poured at different times on a ſcouring, certainly preſerves the neceſſary coolneſs and acidity for a good fermentation.

Hides raiſed by barley are commonly cut in two before they are worked, whereas thoſe done with lime are generally whole.

In ſome places the hides raiſed by barley, remain in the ſcourings ſix weeks in ſummer and three months in winter, before they are ſufficiently filled: they are each day taken out for two or three hours, and put on boards placed on the ſide of the vat; this operation is neceſſary, as the contact of the air facilitates, and keeps up fermentation.

The preparation of theſe barley hides at *Sedan*, conſiſts of nine or ten little vats, containing about ſix hogſheads; each of theſe vats has its different degree of ſtrength; that which has been once worked becomes one degree inferior; and inſtead of being the tenth, it is named the ninth for the following hides: that which has been worked twice is called the eighth, and ſo alternately to that which having ſerved nine times, becomes the firſt in the order of ſcourings, and is the weakeſt of all.

In the firſt barley liquor thus weakened, and which has already ſerved nine times, five hides are caſt in, which remain one or two days; from thence they paſs into the ſecond vat, which is a little ſtronger, (that is, a little more ſour) becauſe it has ſerved but eight times, and thus of all the others which the ſame hides go through ſucceſſively.

Sometimes the hides go through only the third or ſecond vat, according to their degree of ſtrength.

The ſour liquor of the firſt, and weakeſt of the vats, which hath ſerved even ten times, is not always uſeleſs; as long as it ſeems ſufficient for the firſt preparation, it is preſerved, and ſo of the reſt: this is not the caſe with bark liquors uſed to raiſe hides; they are not kept beyond the firſt time; and the lowermoſt vat which has been uſed ten times, is emptied (if ten vats have been made uſe of): I ſhall treat of this in the preparation by oak liquor, or ouze.

In ſeveral provinces they have but three vats for one dreſſing, of which they make three ſcourings, the dead, weak, and new, in this manner; the hides being ſufficiently ſoftened, are put into a dead working till they loſe their hair; in the ſame manner as the dead pits only ſerve at firſt to take off the hair, ſo the dead ſcourings are uſed to diſpoſe the hides for new ſcourings, and alſo to take off the hair.

After one or two ſcourings, the hair being diſpoſed to come off, the hides are poliſhed on the beam with a round knife, and then caſt into clear water for twelve or twenty-four hours, as neceſſary. They are taken out of the water, and put into a weak ſcouring, where they are plunged down once a day, until they appear to have taken a body, when they are fleſhed; after which they are caſt into water for the ſpace of ſix hours; the workmen term this the ſoaking of the feeble.

The third ſcouring muſt be a new ſcouring, made up as before mentioned, of about twelve pounds of flour of barley for each hide weighing twenty-four pounds when dry: with one quarter of this flour a leaven is made, and when it begins to riſe, which generally happens at the end of twenty-four hours, unleſs exceſſive cold retards the fermentation, it is diluted with the flour in a vat, containing as much water as neceſſary for the number of hides to be ſteeped: each day the hides are to be taken out of this new ſcouring and put in again, till they have acquired the ſwelling and riſing ſufficient.

The above proceſſes vary in many places; no general rule ſhould be laid down in this operation, as it is open to many diſcoveries and improvements.

At the manufacture of *Barois*, at *Paris*, for example, they manage five ſets at once, which are compoſed of four vats each; theſe vats are three feet high, and four and a half in diameter; eight hides are put into each vat, and conſequently each ſet is compoſed of thirty-two hides; they take them out twice a day, and re-enter them as often.

Every four days a new ſcouring is made in one of the four vats, that is, in the weakeſt; after having flung out this old ſcouring and waſhed the vat, then the third ſcouring becomes the laſt or the weakeſt, and that which was the firſt and the ſtrongeſt, becomes the ſecond.

The eight hides which enter every eight days in each ſet, are plunged eight days in the fourth ſcouring, which is the weakeſt; and four days in the third ſcouring, which is equally weak; ſo on two days in the ſecond and firſt: at the expiration of ſixteen days they are peeled, and they are put into the four other ſcourings; thus each hide goes twice the round of the four vats. The ſame vat it enters coming from the butchers is that from which it is taken out to paſs into the red ſcourings.

Each new ſcouring for eight hides, in this tannery at *Paris*, conſiſts of ten buſhels *, or one hundred and thirty pounds of ground barley, more or leſs: the leaven is made the day before with three out of the above ten buſhels, by ſteeping it in hot water.

This interval of thirty-two days is ſufficient to prepare the hides, either in winter or in ſummer; but ſometimes in winter they make uſe of hot water to accelerate the fermentation, by adding, for example, five or ſix pails of hot water into one ſcouring.

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* The ſeptier of barley, or 12 buſhels in grain, produce 195 pounds of flour, or 15 or 16 buſhels of flour: the ſeptier of grain coſt 7 livres in 1763, but it is ſometimes from 8 livres to 10, and ſometimes more: the ſeptier of wheat coſts from 15 to 18.

A hide of one hundred weight when green, and raiſed by barley, takes about two hundred pounds of powdered bark, *viz.* fifty for the red ſcourings, ſixty in the firſt barking, fifty in the ſecond and forty in the third: in ſome places it is diſtributed in baſkets of about forty-five pounds; eight hides require three baſkets for the red ſcouring, ſixteen in the firſt barking, and eight in each of the other two barkings.

The hides being ſufficiently filled by the barley ſcourings, called in *France* white ſcourings, are put into the red.

The red ſcourings is made of pure water with two or three handfuls of bark between each hide.

The hides remain in this ſtate three or four days, at the expiration of which, they give them as much more bark in the ſame ſcouring, where they continue three days longer, when they may be pitted after the ſame manner as hides raiſed by lime: theſe red ſcourings give them a neceſſary degree of firmneſs, ſo that the action of the tan in the pit may not be too immediate, and harden them too ſuddenly.

What I have ſaid of the common method of filling hides by barley, is a ſufficient explanation for expert tanners who might be ignorant of this proceſs; but I muſt own it requires practice and knowledge to know when a hide is ſufficiently filled, and to conduct the ſcourings properly. We ſhall ſtill enter into a more minute detail concerning the method practiſed for the *Walachian* hides; as it is not ſo well known as the preceding.

Of Hides prepared after the manner of Walachia, by warm ſcourings.

Hides raiſed by barley in only one hot vat, are ſometimes called *Walachian* hides, becauſe it is ſaid the method has been brought from *Walachia:* theſe people are tributary to the *Turks*, who inhabit the ſide of the *Danube*, between *Bulgaria* and *Poland:* prince MAURO CORDATO made their name celebrated, and in his days arts and ſciences were known amongſt them: from thence it is pretended the method of making *Walachian* hides came to us, which conſiſts in putting the hides into a very warm ſcouring for the ſpace of thirty hours, after the following manner.

When the hides are ſoftened in water, they are trampled, and the round knife paſſed on the fleſh ſide, to render them ſupple; they are again rinſed afreſh, to clear them of all filth, and then put on poles to drain.

This done, it is to be obſerved, either on the poles, or in the floatings, whether the hair eaſily detaches itſelf, which may happen in the ſummer and in warm countries, without any other preparation; if ſo, the hair may be taken off on the beam; if not, they muſt be ſalted, to prepare them for that operation.

The method of taking the Hair off.

The ſalting of a ſtrong hide conſiſts in ſcattering two or three pounds of ſalt of morue, alum, and ſaltpetre, over each half hide; the other half is turned over that which has been ſalted, and they are laid the one over the other as equally as poſſible.

Being thus ſalted, they are piled the one over the other; the pile is covered with ſtraw, or with a large ſack; in this ſtate they ſoon begin to ferment and heat; they are turned over once or twice a day, changing the fold and ſide, that the fermentation may be equal, and that no part may be more damaged than another.

This fermentation diſpoſes the hair to looſen; but it muſt be obſerved not to wait till it falls off of itſelf, or that it be too eaſily plucked off; for the grain of the hide might thereby be damaged.

If any obſtacle prevented the depilation or taking off the hair, on the day the hides are ſufficiently heated, they ſhould then be caſt into water for a day or two, but not longer, as they would be in danger even in water.

On inſpection, if ſome ſkins are ſooner heated than others, they muſt be taken from the pile, and thoſe which require more heating muſt be left.

The hair may alſo be taken off by the heating, without ſalt; they muſt be folded fleſh ways, flap to flap, very exactly, they are then to be laid one on the other on a bed of ſtraw litter, for that is more ſupple and fitted for fermentation that new ſtraw; they are afterwards covered with a large quantity of the ſame ſtraw, and thus they are left for one day.

They next day they change ſides; part of the upper ſtraw ſerves to make a thinner bed, upon which they are again laid, beginning with the uppermoſt; the remainder of the covering, with the ſtraw that ſerved them as a bed, is made uſe of to cover them again; in this ſtate they are left for one day, more or leſs, according as the hair is more or leſs adhering: and as it would be dangerous to let them heat too much, they muſt be inſpected twice a day, to know the inſtant of the degree of fermentation ſufficient to detach the hair, but not to exceed it.

The hair ſhould crackle when it is pulled off, and make a ſlight reſiſtance; it is even as good if it comes off by a ſtrong twiſt, for the better the hide will prove, becauſe it has not been too much ſoftened by the heating.

If before heating theſe ſkins, there are any ſpots where the hair has been rubbed off, they muſt be bathed with a ſpunge or linen, ſoaked with ſalt and water, to prevent thoſe places heating before the reſt of the hair be diſpoſed to fall.

Very warm dung would ſhorten one half of the time of this operation; but then the hides muſt be totally buried, and great attention paid to the critical moment the hair would be ready to quit.

This method is dangerous, for if any part fails through inattention, all is ſpoiled, and the hides become too tender, yet by taking them up early they may be ſhaved without danger.

Walachian Manner of preparing the Scourings.

Whilſt the hides are heating, a leaven of good wheaten flour is prepared to fill them: twenty pounds of flour is to be diluted in water, and kneaded like dough for bread; with a little old dough, half a pint of vinegar may be added to quicken it; this leaven muſt be left in a moderate heat two, three, or four days, without being touched, covered with a cloth or woollen ſtuff; it will then be ſufficiently ſoured, and fit to make the compoſition by which the hides are to be filled.

The twenty pounds of flour preſcribed for the firſt leaven, are ſufficient for ſix or ſeven great hides weighing fourſcore pounds when green, or eight or nine young hides: the twenty pounds of flour will produce thirty pounds of leaven, a third of warm water being requiſite to knead it.

It has been proved by experience, that a firſt leaven without vinegar would be ſufficient, and that it ought to be uſed the next day, or the day after; for, according to the baker's obſervations, leaven loſes its ſtrength inſtead of acquiring it, when kept above twenty-four hours, particularly in cold weather. When the leaven is well ſoured, the compoſition is to be made; for that purpoſe a vat of five feet in diameter, and three feet in height, is made uſe of: one vat is ſufficient for a work of ſix hides; but if a greater number are to be conducted, ſeveral of the like vats are to be uſed.

The vats muſt be very clean, and free from all foreign matters that might have been put in, ſuch as lime, glue, oil, or other ſubſtances which are foreign to the acid fermentation that is to be produced.

Each vat that is to be employed in the ſcourings, muſt be half filled with clean water: out of each ſix or ſeven pails of water are to be taken, which is to be put into a boiler over a fire: when this water boils, part muſt be taken out, with which about ſixty pounds of ground barley is to be diluted in a veſſel for that purpoſe: that quantity ſerves for each ſcouring of ſix large hides. The lumps are to be carefully ſmoothed, as they would be ſo much matter loſt and deprived of action, and the paſte is to be cleared with cold water, unto the conſiſtence of a ſtrong paſte.

The paſte thus diluted is again returned into the boiler; and kept continually ſtirring with a ſtick, to prevent the flour ſettling or burning at the bottom, and it is kept on the fire until it takes three ſtrong boils.

This paſte is divided into the vats appropriated for the ſcourings; it is ſtirred with a ſhovel, backwards and forwards, to facilitate the inteſtine motion intended to be produced; at laſt the motion muſt be ſuddenly ſtopped with the ſhovel: this forwards the fermentation; thus milk turns by being ſtirred two different ways.

The ſcourings thus compoſed of flour and water, a pailful or two of this compoſition is taken out of each, which is replaced on the fire for the leaven, and in the mean time the vats for the ſcourings are covered with boards cloſely joined.

As ſoon as the compoſition begins to ſimmer, even before the firſt boil, the pot is taken from the fire; and this compoſition is uſed to dilute the leaven above deſcribed in a ſeparate veſſel. This leaven thus diluted with the barley compoſition, is equally diſtributed amongſt the vats; it is alſo ſometimes heated, to augment the heat of the compoſition.

Theſe vats or workings muſt be ſo warm, as to ſuffer the hand and arm to be kept in without pain: ſix pounds of ſalt being added to each vat, it is ſtirred, and covered again to let it ſour for ten or fifteen days; care is taken to ſtir and mix it well twice each day, which done it is cloſe covered, leſt the cold air ſhould prevent or retard the fermentation. The addition of ſalt appears to be very neceſſary, to correct the acid of the compoſition; for hides that have been raiſed or filled without ſalt have had their edges eaten.

The hides ſweated or heated as above, having had the hair ſhaved off, by the round knife, ſtone, ſand, or aſhes, are brought to a running water to be well waſhed, both on the grain and on the fleſh ſide; they are ſtrung three by three at the end of a rope, and flung into the water, where they readily ſink; they are there left four or five days, until they are ſufficiently ſoftened, taking them out twice each day, rinſing and draining them, and caſting them immediately into the water again: by this means the mud and ſlime is carried off by the water, which if left on would damage them much: if they are not thus ſoftened they pucker in the grain, which indicates a hardneſs that renders them difficult to tan.

Where there is no river, the hides may be ſoftened in ciſterns or vats, changing the water each day: they muſt be ſoftened ſo, that the nail being applied on the grain it may leave its mark;

when ſufficiently ſoft they have a yellow caſt, and often little violet ſpots appear; they are then fleſhed, either with the round knife, or the two-handled knife, which is moſt in uſe in *Germany*.

The fleſhing is not an eſſential operation; it adds nothing to its quality, but is a work of neatneſs. Fleſhing to the quick, or diſcovering the vein, is to take off, by means of the round knife, all the little particles of fleſh, and other uſeleſs things which adhere to the ſkin, ſo that the fleſh ſide may appear nearly as white and even as the grain.

After fleſhing to the quick, the hides muſt be ſhaved, becauſe the depilation is not generally ſo well performed but that ſome ſmall hairs remain, which are taken off with the two-handled knife, which is a ſharper inſtrument than the round knife and ſtone that are uſed in ſhaving off the groſs hair.

A bed muſt be formed of ſeveral ſkins extended on the beam, upon which the one to be ſhaved is placed; by means of this bed the ſkin yields and extends itſelf, ſo that the grain runs no danger of being hurt: for if the ſkins were to be ſhaved on the bare wooden beam, the knife finding a reſiſtance would divide the grain. After flinging a pail of water on the bed to waſh it, the ſkin is paſſed on the grain ſide with the half round knife to take off the filth and extend the nerve, but the two-handled knife is the beſt for ſhaving clean.

Yet all workmen cannot uſe this knife; it requires as much ſkill as the profeſſion of a barber to ſhave the hides perfectly clean. For the greater facility both of fleſhing and ſhaving, the knives not in actual uſe ſhould be kept in water.

If holidays or other obſtacles ſhould prevent the fleſhing or ſhaving, the work might be ſuſpended for ſome days, by putting the hides in cold water, particularly in ſpring water, being the fitteſt to ſuſpend fermentation.

When the hides are ſhaved, they are put into clean water, then rinſed, and placed on poles to drain for twenty-four hours: but if they are to be run over again on the beam, they need not be put on the poles.

While the ſkins are ſhaving, or even before, a ſecond leaven is prepared after the above-mentioned manner, with this difference, that only ſixteen pounds of flour is made uſe of for ſix hides, inſtead of twenty that compoſed the firſt leaven; this ſecond leaven, like the firſt, is put in a warm place, ſo as to excite fermentation. Sixteen pounds of flour will make about twenty-five pounds of leaven.

The ſour and clear liquor of the firſt compoſition is drawn off, the dregs flung away, and the clear liquor put into the vat where the firſt ſcouring is to be made, to form a ſecond compoſition, called the *complement*, and which is made like the preceding.

From each vat containing the clear and ſour liquor, take ſix or ſeven pails, which put into a kettle over the fire; when this water hath given three boils, part is taken out, in which is diluted about fifty pounds of ground barley, that is, about eighty pounds for each hide ; the remainder of the hot liquor muſt be poured in little by little.

This liquor having thoroughly diluted the new barley flour, it muſt again be ſlightly boiled, and the whole be divided on the ſcourings.

The ſcourings having been well ſtirred with the new barley liquor, a pailful or two are taken out to be heated : when this liquor ſimmers, the ſecond leaven is to be diluted in it, made as before with ſixteen pounds of flour ; and this ſecond leaven thus diluted is to be poured into different vats : five or ſix pounds of ſalt are to be added to theſe new vats, as has been mentioned with regard to the other vats ; the ſcourings are to be well ſtirred, two or three pails muſt be taken out to heat during the whole filling or raiſing of the hides.

If this proceſs by two barleys and two leavens, to form a white ſcouring, ſhould appear too troubleſome, it might certainly be ſhortened, by uſing at one time thirty pounds of leaven, one hundred and twenty pounds of barley, and ten pounds of ſalt, for each ſcouring for ſix hides ; but I have here deſcribed with a punctual exactneſs the proceſs of Monſieur *Teybert*, in which he ſeems to have been too exact.

Thoſe tanners that fill by barley, in the common method, uſe at one time in their firſt ſcourings, pretty nigh the quantity of barley we have here directed at twice ; but they are ſometimes obliged, when their firſt is not ſufficient, to make a ſecond, which greatly augments the expence; ſo that the proceſs of *Walachia* is leſs coſtly, and at the ſame time ſhorter.

When the ſalt is put into the ſcourings, they muſt be kept a long time in motion; two or three pails are to be taken out of each, which muſt be kept in a boiler over a moderate fire, during the time the hides are ſcouring, in order to repleniſh the vats, and preſerve the heat; and a greater quantity muſt be taken out to be placed in a vat of reſerve, ſo that there may only remain in each ſcouring a ſufficiency to cover the hides that are to be put in.

Mr. *Guimard* has proved from experiments made at *Paris* in 1748, that it was better to make the compoſition at once, than at twice; and indeed beſides the time it takes, and the fuel it conſumes, it may ſo happen that the complement made with freſh barley, blunts the acids of the principle, which had already begun to open itſelf; if that ſhould happen, the effect will become more ſlow, for a new fermentation muſt be made, and a degree of heat increaſed for that purpoſe, which would be prejudicial to the hides.

Different methods have been tried in making the compoſition at one time, which have pretty nigh ſucceeded alike.

Firſt, With ground barley or rye, (without leaven) and which had been prepared the eve before with boiling water.

Second, With equal parts of ground barley and leaven, diluted in water almoſt boiling; that is, ſimmering, at the inſtant the hides were to be put in.

Third, With wheaten bran, half a buſhel to each hide, without leaven. This bran is ſoaked in warm water, and ſuffered to ferment for one day; a pound of ſalt is added for each hide, at the very inſtant they are put in to be raiſed or filled.

Fourth, By uſing leaven of barley or rye, which is leſs expenſive than wheat, as ſix or eight pounds of grain ground is ſufficient for each hide. As ſoon as this leaven riſes, it muſt be uſed, and for this purpoſe, it needs only to be diluted in a little lukewarm water, and to fling a little ſalt, as before, at the inſtant the hides are to go in.

Manner of conducting the Scourings.

When the waters for the ſcourings are prepared, the ſkins are taken off the poles, and plunged into the ſcouring for two minutes, to quicken them, and to cauſe them to contract the heat of the ſcouring by degrees. They are taken out on the cover of the vat, and left to drain three or four minutes: in which time the compoſition is ſtirred afreſh: the ſkins are put down again, the ſcourings covered, and the ſame degree of heat kept up, by the addition of the compoſition kept in *reſerve*: in a quarter of an hour after, the ſame hides are taken out the ſecond time, and left to drain for half a quarter of an hour; in half an hour they are taken up a third time, and left to drop a quarter of an hour: in one hour more they are taken out for the fourth time, and ſuffered to drain ſomewhat longer: one hour after this they are taken out a fifth time, and allowed half an hour's draining: in ſhort, at the end of two hours they are taken up a ſixth and ſeventh time: the following day the hides are twice taken out; ſometimes three or four times, if the hides are not of a good quality, and appear difficult to fill: at each interval the ſtirring is continued, that the barley flour may not intirely ſettle at the bottom, and the vat is cloſely ſhut after the hides have drained half an hour. It is uſeleſs to ſay that the degree of heat above mentioned muſt always be ſuch, as to ſuffer the hand to remain in the vat; and this may be regulated by means of the boiler, which keeps the liquor in *reſerve*; its uſe being not only to warm, but to repair the matter that diſſipates, or that is abſorbed by the hides: the hides muſt be always covered in the ſcourings.

All theſe frequent liftings of the hides out of the vat, followed by the drainings, cauſe the compoſition to bite and penetrate equally in all parts; without this, ſome parts of the hide would be burnt by the ſtrength of the compoſition, and others (as in the folds) would take no nouriſhment.

To place the ſkins in the ſcourings requires two men, who take them by the extremities, and extend them on the fleſhy ſide in the ſcourings, plunging them down with ſticks, and cauſing the air to aſcend, that they may ſink the better.

The white ſcouring commonly produces its effect in thirty hours, or thereabouts; and by their acquired firmneſs in that time may now be denominated hides, being in their former ſtate but ſkins.

It would be dangerous to let the hides remain longer in the ſcourings; nay in that time frequently, the ſtrength of the compoſition burns the edges, ſo as to appear like rotten linen.

The hides being taken out of the ſcouring, the cleareſt part is preſerved, to ſerve after as a beginning to a new working, by adding a complement a little ſtronger than the firſt. The white ſcourings once ſet a-going, coſt no more to keep up than the half of the firſt expence.

The hides are drained on covers, till they are thoroughly cooled; they are then put into water, where having ſoaked an inſtant, they are rinſed, to take out the glutinous humour left by the barley, and are then put to drain.

Whilſt the hides are rinſing, the red binder is preparing, into which they are immediately to paſs. The name of red binder comes from the colour the *oak-bark* communicates to it, as they commonly call white ſcouring, or ſimply white, that which is made with flour.

Of the Dangers the Scourings are expoſed to.

It often happens that the ſcourings turn like wine and milk mixed; the *mucilaginous* part quits the more *ſerous*, in which it was diſſolved, and the liquor is no more *homogeneous*.

A mucous fluid is generally ſaid to turn when it decompoſes itſelf, ſo that the intimate union of the different part of the fluid ceaſes to take place; the ſpirituous parts then diſengage themſelves from the oily, the liquor ſours, and putrefaction would ſoon ſucceed. Wine, which is very ſpirituous, does not eaſily turn, becauſe the ſpirituous keeps the oily parts in a ſtate of diſſolution.

Thunder ſhowers in ſummer are always very ſulphureous, which is the reaſon they turn milk; but by putting a little alkali in the milk it is prevented, adding to the ſulphureous acid, a ſubſtance which eaſily unites with it, and prevents its action on the milk: thus it is probable that the ſcourings might be prevented from turning, by the addition of pot-aſh, a cheap and univerſal remedy.

Some tanners, on the approach of a thunder ſtorm, to prevent the turning of the white ſcourings, put into each vat, old iron wrapped in packing cloth, to prevent the iron from ſpotting the hides: perhaps the aſtringent force of the iron conſolidates thoſe parts too eaſy of diſſolution, or the electric matter, attracted by the iron, quits the fluid of the ſcourings; or what is ſtill more probable, the iron uniting with the acid, ſaturates the exceſs, and ſtops the progreſs of the fermentation: thus by caſting filing of irons into vinegar, its acid is blunted, by forming a martial ſalt, which is ſtyptick, but which has ſcarce any acidity; thus alſo from lead, ſweet ſugary cryſtals are produced from the moſt cauſtic and concentrated acid. Others think that a pound of ſalt, or half a pound of ſal ammoniac, will prevent the ſcourings from turning; this muſt happen from the ſame principle; the ſulphureous acid joining itſelf to the ſal ammoniac ſooner than to the parts of the ſcouring. There is even a probability that if the ſcourings do not often turn, 'tis owing to the putrid matter of the hides, which forms with the acid of the ſcouring an ammoniacal ſalt, and this ſalt abſorbs the ſuperabounding acid, which would too much increaſe the fermentation.

The ſcourings having once failed, there is no remedy; neither will the hides be of a good quality: they cannot fill ſufficiently to be well tanned; their fibres become ſoft and relaxed; they are ſpungeous, and are not capable of receiving the neceſſary ſtypticity which a good tannage requires. Therefore the ſummer heat is prejudicial to this operation; the months of *July*, *Auguſt*, and *September*, are more to be dreaded than any others throughout the year.

When the ſcourings freeze, they are left quietly under the ice; in this ſtate the hides are not forwarded, but they loſe nothing of their quality; the ſcourings however are loſt; for after the thaw they are uſeleſs, and muſt be caſt out.

Of Hides raiſed or filled by Barley, as practiſed in England.

I have ſeen ſeveral tanneries in *London*; in moſt of theſe, they raiſe the large hides with barley, and this cuſtom is very ancient; but the upper leathers are prepared with lime and pigeons dung, as being of leſs conſequence.

The barley ſcourings are made with hot water; and are carried on a great deal quicker than the *French*; for the hides go through four or five ſcourings in ſix days, from the weakeſt to the ſtrongeſt: they remain but twenty-four hours in the laſt, which is a new ſcouring that has ſoured for a fortnight.

To make a new ſcouring for ſix hides, they dilute five or ſix buſhels of ground barley in warm water; they let it reſt until it grows extremely ſour, to haſten the fermentation and the ſwelling of the hides; they wait till the acid is much ſtronger than in *France*; the danger does not laſt ſo long, but it is perhaps more conſiderable, as they muſt be watched with great attention. An inconvenience attending the uſe of barley in tanning is in caſe of a ſcarcity of grain.

On this account in 1740, the raiſing of hides by barley was forbid; the ſtarch-makers and brewers were alſo prohibited the uſe of it in their works: two buſhels, or even two and a half, which a hide of fourſcore pounds requires, would ſubſiſt a man for two months in thoſe countries where barley is made into bread.

Of red Binders.

Barley hides and *Walachian* hides, having gone through the white ſcourings, are to paſs into the red binder, where they begin to tan. Here follows the method of preparing red binders for the *Walachian* hides.

For every ſix hides put into a vat, a baſket of oak-bark, containing about thirty-five, or forty pounds, cut in pieces about the bigneſs of the finger; this they call in *French gros* or *regros*, (from being cut large) and the hides are let down at the ſame time. This operation generally is begun in the morning; the hides are taken out at twelve, and at ſeven in the evening.

The firſt time they are taken out, they are left to drain half a quarter of an hour: the ſecond time a quarter of an hour: at night thirty-ſix pounds of bark, cut after the ſame manner, is added, and after well ſtirring the binder, the hides are put in; they muſt be quickly laid down, that the bark may not have time to precipitate itſelf, which would feed the lowermoſt hides to the prejudice of the uppermoſt. The ſecond and third day they are alſo taken out three times, and the hides are left to drain half an hour each time; in the morning only is added twenty-four pounds of ſuch bark as before.

The fourth day, they are only taken out morning and evening; the draining laſts three quarters of an hour each time, and no bark is added.

The fifth day, the hides having been taken out in the morning, are drained for three quarters of an hour; after which two men ſtir the binder, one from the ſurface to the middle, the other to the bottom; and in proportion as the hides are laid down, ſome handfuls of bark are flung between each, and a little on the top one, whoſe fleſh ſide muſt be uppermoſt, (the others are placed with the fleſh ſide downwards:) the ſix hides require for this laſt binding forty eight pounds of the large-cut bark.

The hides are thus left for eight or ten days, after which they are taken out for the laſt time, waſhed in a running water, and fit to be laid in the pit.

The juice or clear red, that remains from theſe bindings, is as good to preſerve as the clear white; it operates better than a new binder, and ſpares one third of large bark: but it muſt be made uſe of in the ſpace of a fortnight from the time of its being taken from the hides: that time expired, or at moſt three weeks, it has ſcarce any ſtrength.

The red bindings do not require to be covered as the white; but they are kept always full, to two inches of the edge.

The red bindings ſtrengthen the hides, and by degrees diſpoſe them to feed on the nutritive parts of the bark in the pit. Without this operation, the hide would too ſuddenly receive the ſtrong nouriſhment in the pit, would loſe its filling, grow horny, draw on the grain, and at length reſiſt the aſtringent parts of the tan.

Advantage of the Walachian *method.*

The *Walachian* method which I have now deſcribed is leſs liable to inconveniencies from thunder, or other accidents than the common ſcourings; firſt becauſe thoſe of the new method do not laſt good ſo long; ſecondly, becauſe the fermentation is ſtronger, and the compoſition more worked by fire: the ſame preference muſt be given to the red bindings; they are ſtronger, conducted by degrees, and made with the bark in ſubſtance, whereas the ordinary red of the tanners is made with the powder tan.

If, nevertheleſs, it ſo happened, that the ſcouring had turned, then the hide takes air, ſwims on the ſurface, and makes a whiſtling when preſſed. Such a ſcouring cannot be mended; it muſt be flung out, to make room for a freſh one, in which the hides are placed, after they are well drained; but a hide that meets with this treatment never tans well.

Manner of poliſhing, on taking off the hair of the Wallachian hides.

By repeated experiments made at *Paris* in 1748 on the *Walachian* method, it was found, that the trouble and danger of heating before deſcribed, might be omitted, by putting the ſkins with the hair into the common compoſition, which cauſes the hair to fall off without danger, and with ſo much facility, that one man would poliſh ſix times more than thoſe heated with ſalt, after the manner above mentioned.

It was alſo found, that after the depilation or poliſhing, if the ſkins were left long in ſoak, they run a riſk of being pricked by the liquor, that is, of having ſmall holes in them, which inlarge in the working.

Experience convinced us alſo, that when the hides are ready to receive the ſwell, it is uſeleſs to drain them, and that each time the hides are taken out of the ſcourings, it is proper to briſken them in the river; but they muſt firſt be cold, or they would be liable to incline to the grain, that is to be wrinkled and hardened, if they were ſuddenly plunged into cold water, when their pores were opened by heat.

Hot Scourings with Bran.

In 1749 a memorial was preſented to the *Intendant of Commerce*, containing a method of making white ſcourings with bran alone, and totally ſuppreſſing the red binders; as we cannot dwell too long on ſo intereſting an object, we ſhall give the proceſs, that thoſe who have courage enough to make further trials, may learn from what has been already practiſed.

Two or three days before the hides are ſufficiently ſoaked, a leaven is made with wheat or rye flour, unleſs lees of beer can be procured. A pound or five quarters of flour is ſufficient for each hide; this leaven is to be kept in a moderate heat, till uſed.

The night before the hides are to be filled, the dirt and filth that ſticks to the hair is to be taken off; they are to be fleſhed, and put into water: the ſame evening a ſufficient quantity of water muſt be heated to bathe them intirely: when it is luke-warm, it is taken from the fire, and ſeven or eight pounds of wheaten or rye bran is put in for each hide; they are to be well ſtirred together, and the pot covered to concentrate the heat, it is left in this ſtate to ferment, till the bran riſes on the water, which generally happens the ſame night; from whence it may be judged that the fermentation is ſufficient; the hides are then to be well rinſed, and immediately without draining, to be put into a vat to ſupple with the bran and water, which was in a ſtate of fermentation in the veſſel.

Whilſt the hides are taking their firſt degree of heat in this ſcouring, freſh water muſt be put into the pot, to replace that which the hides may have ſoaked in their filling, and this is to be heated till it ſimmers. When it approaches this degree of heat, the hides are raiſed in the ſcouring, and the warm water is taken out little by little to dilute the leaven before mentioned, in a ſeparate veſſel.

The leaven being clearly diluted, is flung into the ſcouring out of which the hides have been lifted; what remains in the pot is alſo flung in, to render the ſcouring a little more than lukewarm; about a pound of ſalt of *morue* to each hide is caſt in, and the whole compoſition is well ſtirred, the hides replunged, and the ſcouring covered.

As the firſt ſcouring does not require to be ſo full of compoſition, and it is ſufficient if the hides are covered, a certain quantity is taken out, which is returned into the boiler, for the advantage of heating the hides, when they are taken up ſix hours after.

If the work has been begun at ſix in the morning, at twelve they muſt be taken up, the ſcouring heated, the compoſition well ſtirred, the hides replunged, and the ſcouring covered.

The ſame operation is to be renewed again the ſame day, at about ſeven in the evening; the next day, and the following day, at the ſame hours, that is, lifting up, reheating, ſtirring, and covering the ſcouring.

Attention is to be paid in taking up the hides on the ſecond and third day, if the hair is ready to quit; after they have been ſhaved, they are to be ſlightly fleſhed, to take off the ſuperfluous parts, then left to ſoak a quarter of an hour in cold water, and again put into the ſcouring, which is reheated ſeveral times and covered cloſe, till the filling is perfected.

It is eaſy to fill the hides in twenty-four hours, if the compoſition be reheated ſeven or eight times, but the hides will be better if this operation be made in three days, and the ſcouring gradually heated three times a day, proceeding from a gentle heat to a ſtronger, and after ſuch a manner that the naked arm may reſt in it without pain at the higheſt degree of heat.

If this method be carried on where there are large quantities of hides in the ſcourings, they will preſerve their heat longer, and it will be ſufficient to reheat the ſcouring twice a day; the operation may be prolonged to four days, and it will be poſſible to ſave a pound of bran on each hide, that is, to uſe but ſix pounds for each inſtead of ſeven.

There is alſo an œconomy in making ſeveral ſets to ſucceed, as ſoon as the firſt filling is finiſhed, by throwing other hides into the ſame vat, without giving it time to cool, and it will be ſufficient to ferment theſe new hides until the hair falls off.

Theſe ſecond hides, thus peeled in a feeble ſcouring, might be finiſhed in two or three reheatings in a new ſcouring, and this new ſcouring will perhaps be ſufficient to the entire filling of a third ſet of hides; thus three ſets may be ſwelled and raiſed by two compoſitions: experience muſt direct the tanner in this.

The hides being ſilled, muſt be rinſed, and ſteeped in clear water for three hours, more or leſs, according to the heat or cold; they then go through the red binders, either with old liquor of bark, or with a liquor of clear water, with freſh bark of the ſize of the finger, which is added ſucceſſively, and by degrees. The beſt tanners in *France* take them out three times in the ſpace of three or four hours, leave them to drain a quarter of an hour, and then lay them down after the binder is well ſtirred.

Cold Scourings with Bran.

Tho' I have fully laid down a method of making ſcourings with bran, by which the vat is to be ſeveral times heated, yet this may alſo be done cold; but then the filling is protracted, and may laſt two months; for heat greatly accelerates fermentation, altho' ſome think it a prejudice to the hides; perhaps this fear may be ill founded. After making a leaven with two pounds of flour of barley, or rye, for each hide, it is left to ferment, and then diluted with clear cold water; the hides are put in with the hair. They are taken out two or three times a week, leaving them to drain the whole night on the ſcouring; they are thus continued till the hair ſeems inclined to quit.

The hides being ſhaved, rinſed, and lightly fleſhed, they are put to refreſh two or three hours in the water, after which they are put down into the ſame ſcouring to complete their filling. If the firſt ſcouring is not thought ſufficient, a ſecond muſt be given, to finiſh the filling; but when a firſt dead ſcouring has been uſed to peel the hides, one new ſcouring alone will be ſufficient to raiſe them perfectly; they being already prepared by the dead ſcouring which ſerved to take the hair off. The ſcourings with cold bran ſtand in no need of being covered, as we preſcribed for the hot; this method may be of uſe to poor country tanners, who have neither boilers or furnaces.

Thus M. *Guimard*, an able tanner, thinks that eight pounds of bran are ſufficient to a hide; while thoſe who fill by barley are obliged to make uſe of a hundred weight; and thoſe who follow the *Walachian* manner require thirty-ſix pounds of flour: and by this method, ſalting and heating of hides would be avoided, and fuel ſaved.

Hides filled or raiſed by Rye, after the method of Tranſilvania.

Tranſilvania is a province bordering on *Turkey*, a little diſtant from *Walachia*, where hides are worked much in the ſame manner we have already deſcribed. The chief difference conſiſts in uſing for each hide eighteen pounds of ground rye, inſtead of twenty pounds of barley, neceſſary for the *Walachian* method: of theſe eighteen pounds of rye, ten are put into the firſt compoſition, and eight into the complement or ſecond.

The dregs of rye preſerving their ſtrength and quality longer than barley, they are not caſt aſide as thoſe of the latter, but the rye is kept, even after drawing off the ſour liquor of the firſt compoſition, for the purpoſe of the ſcouring.

Several ſhoemakers have thought, that leather made by rye, called leather of *Tranſilvania*, was preſerable to that of *Walachia*; perhaps, in fact, barley being more farinaceous or floury, ferments in another manner, and furniſhes leſs firm and ſolid parts to the hide, for the ſame reaſon that the hides of *Liege* are preferred in certain caſes, which are fermented with liquor of bark or ouze; becauſe its fermentation is harder, or leſs unctuous, leſs laxative than that of ground rye or barley.

In the memoirs of M. *Deſbillettes* preſented in 1708, I find that the uſe of rye was then known in *France*: he ſays the ſkins being ſhaved are put into the river, for twenty-four hours; after that, into a weak tan liquor, for two hours, putting them out and in very often; from thence they are put into another matter, of which the following is the preparation. Take a *ſeptier* of ground barley, (the *ſeptier* of *Paris* is twelve buſhels; the buſhel $661\frac{7}{10}$ cubic inches) and pour on it warm water, ſtirring the whole well till it becomes a thick paſte, as if to make bread: this paſte is left covered to work and ferment like leaven; when the ſurface appears white (and as if muſty) as much cold water as may ſoak ten or twelve ſkins is to be poured on it, then theſe ſkins are to be laid in it for three days; and when they are well filled, they are plunged into a tanning liquor, with a quantity of bark between each; the water muſt be changed two or three times in the ſpace of eight months, which is about the time they require to be well tanned.

Of Hides raiſed by Oak-Liquor or Ouze.

The effects produced by lime-water, or ſour water of barley and rye, might be produced by

ſeveral

ſeveral other means, and ſeveral have been tried in different places: that which ſeems to be the moſt in uſe, and the cheapeſt, is the ſour liquor of bark: Hides are ſaid to be raiſed by bark, when prepared by this method: the *French* tanners are indebted to thoſe of *Liege* for this diſcovery (therefore they are called *Hides of Liege*); this manner is actually followed in ſeveral parts of the kingdom, and perfectly ſucceeds; and to this method the manufacture of *St. Germain* owes its great ſucceſs, and the great eſteem it is now in.

It is called in French *Cuirs a la juſée*, from the French word *jus*, juice, and often, by corruption, *giſée*, or *giſey*, in Engliſh, *ouze*.

Method of taking off the Hair.

To depilate or make the hair fall off from hides to be filled by bark, they muſt be fermented by a moderate heat; this is practiſed by various methods, according to the different places where they are worked.

The hides are piled on the ground one over the other, either in length, or doubled, until a gentle fermentation looſens the hair, and ſoftens the upper ſkin.

Some accelerate this putrefaction, by putting the hides on poles, in a cloſe ſtove, heated by a tan fire, which only produces ſmoke and heat, without flame or danger.

Others place their hides in very hot dung; this produces the effect of a ſtove, and raiſes the neceſſary

ceſſary heat for fermentation. This method may perhaps appear too expenſive and troubleſome; yet it is certain that this dung might again ſerve for its firſt deſtination, *viz.* agriculture, as it would loſe but little of its quality by this operation.

It has been already obſerved of hides filled by barley, that the hair might be made to fall off by a weak, or dead ſcouring. I believe the ſame might be practiſed on hides raiſed by bark; by making uſe of the tan ſcourings when almoſt ſpent, of which I ſhall give the deſcription hereafter.

Hides with the hair on, which come from *America*, *Buenos Ayres*, or the *Iſlands*, and which are dried by the heat of the ſun, are more difficult to be deprived of the hair; and a conſiderable loſs of ſubſtance enſued, when the fermentation was ſufficiently raiſed to make the hair fall off eaſy.

To obviate theſe inconveniencies, the undertakers of the royal tannery at *Lectoure*, tried to ſhave the dried hides from the *Iſlands*, inſtead of taking the hair off by the heat.

This method is equally advantageous, both as to ſalt, and freſh hides; there is a profit on all ſides; the danger of fermentation is avoided, the degree of which it is difficult to hit on; the ſalt is ſaved, the trouble of heating, and the workmanſhip abridged; for one man can ſhave ten or twelve hides a day; whereas by the common method he would not poliſh more than five or ſix.

Of

Of the ſwelling of hides by oak liquor, or ouze.

The hides being poliſhed they are put into vats, to fill and fit them for tanning. At *Namur* and *Liege*, the filling of hides is done by the means of liquors of old bark, or juice of tan, which contains the reſidue of the ſubſtance of the bark, after it has ſerved to tan hides in the ſecond or third barkings: this filling needs no fire; it is even ſaid that heat is prejudicial to it.

This juice of tan, called alſo ouze, muſt contain no *ſtyptic*, that is, of that rough and aſtringent taſte, which contracts and hardens the hides in pit, and which is very ſenſibly perceived in new bark. When the bark has remained with the hides in pit, it is diſpoſed to ferment and ſour, as all plants and animal ſubſtances do in general; the ſtyptic quality then ceaſes, and acidity takes place, which would ſtill go on augmenting, if the hides were not taken out at the expiration of ſome months.

The bark, while in its natural aſtringent ſtate, tightens, compreſſes, and reunites the parts of the hides; but as ſoon as it turns ſour, it produces a contrary effect; it dilates, relaxes, ſwells, and raiſes the celular parts, by the inteſtine motion it produces, like unto bread that raiſes, and wine that bubbles up, when expoſed to the like fermentation.

All ſeaſons of the year, nor all waters, are not proper for raiſing hides by bark liquor; it ſucceeds badly in ſummer; it requires pure ſpring water; that coming immediately from the rock is the fitteſt; rain water is not good.

In ſhort, thoſe who eſteem the hides of *Liege* as the beſt leather, agree that it is the moſt difficult to work; it requires a great ſkill, intelligence, and capacity; but in this, as in other trades, practice ſurmounts all obſtacles.

To prepare the juice of tan, the old bark is collected in which the hides lay in the ſecond or third barking; (the third is preferable;) the liquid which it contains is alſo taken up; the whole is depoſited in an empty pit or other large veſſel.

The pit into which this old bark is laid, muſt contain a waſte *well* or ceſs-pool made with boards, nailed together, and adjoining the ſide of the pit: this ceſs-pool is to contain the water which ſeparates from the tan in the pit; and its ſituation is convenient to empty it with a pail, for the uſe of the hides hereafter explained.

This bark is trampled and drenched with clear water or tan liquor, till it be abundantly overflowed: the liquor gathered in the waſte well or ceſs-pool is taken out two or three times a week, and poured over the tan in the pit, that by repeated filtrations, the juice may become ſtronger and ſtronger, and feed itſelf with the whole ſubſtance of the tan.

Without being at the trouble of making a waſte well in the pit, a kind of well might be hollowed in the tan, out of which the clear liquor might be taken, and filtred through a baſket to have it more pure; but the waſte well is yet more convenient.

About *Sedan*, to make the juice of tan or ouze, they make uſe of vats that contain about fifteen hogſheads of water beſides the bark; (each hogſhead meaſure of *Burgundy* contains only 11520 cubic inches, that of *Paris* 14400; ſo that the muid or hogſhead of *Burgundy* is four fifths of that of *Paris*) they uſe the tan groſly ground, and taken from the pit of the ſecond or third barking: the water remains with the bark for ſix, ſometimes for eight months, and it takes that time to acquire the acidity or ſharpneſs requiſite to fill or raiſe the hides.

When this water attains the degree of acidity without being ſtirred, ſome of the bark is taken out towards the ſide of the vat, to form a kind of well or hollow about a foot in diameter; this muſt go to the bottom of the vat, that a pump may be put in, to take off the liquor that hath ſettled at the bottom, or the waſte well muſt be made uſe of; this liquor is returned on the bark, until it be quick and good: if at the expiration of two hours it be found ſufficient, this work is left off, and all the liquor is taken out to make the ſcouring. The liquor is ſaid to be quick when it is red, clear, and acid, like fine vinegar: when there are two vats of tan liquor, and that the one is more ſtrong and acid than the other, they are to be mixt together, and thereby brought to the ſame degree.

When the liquor has been taken out of the vats, the tan is not uſeleſs; more water is put on, which remains three or four days, and which after that time is endowed with ſufficient qualities to compoſe the ſcourings: this operation is repeated three or four times, obſerving by degrees to let the water remain longer on the bark, to make it yield all its ſtrength, quality, and acidity: theſe different liquors are mixed with the firſt, that had remained ſix or eight months on the tan. The more vats that are made uſe of, the more facility there is in making theſe operations and mixtures.

While the ouze which is to fill the hides is preparing, thoſe that are dry are to be ſoaked; the round knife is paſſed on the fleſh ſide, after the ſame manner as if they were prepared for limeing; but it muſt be obſerved, the laſt time they are taken out of water, they are to be left to drain on the poles, that they may contain no water when they are to be heated.

If they are green hides, this method does not require their being ſoaked; but while they are yet freſh, a few grains of ſalt are flung on the fleſh ſide, that they may heat more equal, and with leſs danger; they are then folded, in order to ſweat or heat; fermentation makes them tender, and diſpoſes the hair to quit. The *Iriſh* hides have no need to be ſo much ſalted in the heating, as they are ſalted before they come to *France*.

Being poliſhed, rinſed, and fleſhed, after the ſame manner as thoſe to be prepared by lime, they are to be ſoaked in very cold and clear water, for two days in ſummer, and four or five in winter; obſerving each day to drain them for three hours, and to change the water; ſometimes in this ſtate the hides are perceived to open, and diſpoſe themſelves to ſwell; ſuch are then put into the ſcouring, that is, in ouze, to favour and augment this filling: towards *Sedan* they make eight ſcourings in ſummer, twelve in winter, and they augment their force by degrees. I ſhall hereafter ſhew the method followed at the great tannery of *St. Germain.*

If the work is carried on in ſummer, the hides are put into river water, mixed with an eighth part of tan liquor, taken out of the waſte-well aforementioned.

The ſecond ſcouring muſt be of two eighths of tan liquor upon ſix eighths of river or ſpring water; the third of three eighths of liquor upon five eighths of water; the fourth of four eighths of liquor on four eighths of water, that is, equal parts; the fifth of five eighths of liquor on three eighths of water; the ſixth, of ſix eighths of liquor, on two eighths of water, that is one quarter; the ſeventh of ſeven eighths of liquor on one eighth water; the eighth or laſt, of pure liquor.

The vernal and autumnal ſcourings being ten in number, are made of putting only a tenth of liquor upon nine tenths of water for the firſt ſcouring; two tenths of liquor in the next, and ſo on augmenting the juice, and diminiſhing the water unto the tenth ſcouring, which is made of pure tan juice.

In winter the ſcourings being twelve, are made by putting only one twelfth of juice upon eleven twelfths of water for the firſt ſcouring: for the next two twelfths of liquor and ten twelfths of water; the third is compoſed of three twelfths of liquor, that is, one fourth, with three fourths of water, and ſo on to the twelfth and laſt ſcouring, which muſt be of pure liquor.

The method of making theſe ſcourings conſiſts in taking up the hides morning and evening, draining them for two hours, after which they are put down again into the ſcourings, and each day the ſcouring is changed, until the fourth ſcouring in ſummer, and the ſixth in winter; that is, during the firſt half of the ſcourings which are to be given.

From this fourth ſcouring in ſummer and ſixth in winter, the hides are taken out but once a day to drain, until the laſt ſcouring but one; that is, to the ſeventh in ſummer, or to the eleventh in winter; they are then only taken out at the end of a day and a half; and after draining for two or three hours, they are put down again; a handful of bark groſly ground is ſcattered on each hide.

The hides remain in the laſt ſcouring three or four days, and being taken out and left to drain for three or four hours, are put into an extraordinary ſcouring, compoſed of the pureſt and ſtrongeſt liquor, with three handfuls of new bark over each hide; they remain in this new ſcouring ſix or eight days; at the end of which they are ſit to be put into pit, like thoſe raiſed by lime.

When a freſh parcel are to be ſcoured, the vat which before was the firſt is emptied and is of no further uſe, that which was the ſecond, becomes the firſt or weakeſt, and that which was emptied, becomes the new or extrà ſcouring, made with the beſt tan liquor, and is the tenth and ſtrongeſt of all the vats: thus each vat before it is emptied, has ſerved for the preparation of ſeventy-two hides.

Although I have ſaid that hides are filled in the ſpace of twelve days, this will ſeldom happen but in the temperate months of *May*, *June*, and *July*, as may be conceived by what has been ſaid on the ſubject of fermentation in general. Sometimes double that time is required: in that caſe the hides muſt be left forty-eight hours in each ſcouring. In cold weather the liquors do not ſpend ſo quick; fermentation is ſlower; the acidity is not ſo readily communicated in extreme hot weather; the liquors weaken themſelves, the hides fill with difficulty, and ſometimes require to be left two days in each vat.

All tanners ſhould have ſpare vats, becauſe ſometimes they do not produce the deſired effect; they ſour too ſlow or too quick, and ſome turn as has been explained in that part treating of barley hides, and the method to prevent it; the heat of the ſun alone is ſufficient to turn theſe ſcourings, as I ſhall ſhew hereafter.

We have ſuppoſed, that to begin a ſcouring, bark is uſed which has already ſerved in the tan pit, but if this was not to be had proceeding from the eſtabliſhment of a new tannery, or from any other cauſe, there are ſeveral means to ſupply its defect.

It may be begun by ſcourings of barley, by the method already explained: and the enſuing year will produce a ſufficiency of old bark for the ſcourings: unleſs ſuch bark has been uſed in tanning hides raiſed by lime which is never good: but, as to make theſe ſcourings, it is only requiſite to ſour the water of the bark (that is, to take off its natural bitterneſs and aſtringent force) to put it into a ſtate of fermentation, the following method may alſo be uſed, without the uſe of grain.

Fill a vat with bark groſly ground, and pour on water which much remain ſeven or eight days; this water being racked off, freſh is added, which muſt be taken out at the end of the next eight days, and thus continue until the water has taken off all the ſharpneſs and bitterneſs of the freſh bark. Then this bark is in the ſame ſtate as if it had ſpent all its force in the tan pit with hides: fill the vat with freſh water, and leave it for the ſpace of eight or ten months, in which time it will have fermented ſufficiently for the uſe of filling hides by bark liquor.

The ſame variety of methods which have been ſeen in the barley ſcourings, may alſo be diverſified in thoſe filled by bark liquor. In ſome countries they fill or ſwell with five ſcourings and uſe but three vats. The firſt ſcouring is called *dead*, becauſe it is without ſtrength, being only compoſed of pure water, and four baſkets of old ſpent tan.

This *dead* ſcouring is only made at the inſtant it is to be uſed, that is, when the ſkins are ſufficiently trampled and ſoftened; and being ſtrongly rinſed from tail to head, and from head to tail; they are put into the dead pit, and taken out three times each day, *viz.* at morning, at noon, and at night; leaving then to drain half a quarter of an hour each time.

The next day, the *dead* is flung away, and the hides are put down three times, into the weak ſcouring as before; this *weak* has been prepared four or five days before, with three quarters water, and one quarter of liquor, on ſix baſkets of tan: they are permitted to drain a quarter of an hour, and the weak, (having ſcarcely any virtue) is caſt out, like the dead, after having ſerved the day.

At the third draining of the hides from the *weak*, they are ſcoured in the *ſtrong*, and likewiſe taken up three times a day, draining them for half a quarter of an hour each time, and ſo for three days.

The *ſtrong* is a third ſcouring mixed up two or three days before, with equal parts of water and juice, aud ſix baſkets full of the tan aforementioned.

At the expiration of two days, the *ſtrong* being exhauſted, the hides muſt be tranſported into a ſtronger liquor; this is the fourth ſcouring, compoſed of the clear of the ſtrong, or preceding liquor, and of the ſour of the waſte-well or ceſs-pool, that is, the juice which has been ſeveral times filtered on the tan.

The hides are laid down in this ſtronger liquor for five days, leaving them to drain half an hour each time, and ſtirring the ſcouring. The firſt day, they are put down in the morning, adding a baſket or thirty-ſix pounds of bark cut about the bigneſs of the finger for every ſix hides;

omitting the bark at noon and night. The ſecond and third day, they are laid down three times again, and at morning only twenty pounds of large cut bark is added as before. The fourth day, they are only laid down twice, and in the morning they add twenty pounds of bark. The fifth day, after having taken up the hides, and left them to drain half an hour, and ſtirring the ſcouring, fling in ſome handfuls of bark between the hides, and on the uppermoſt, unto the amount of forty pounds of groſs bark; the hides are then left to reſt in this ſtrong liquor eight or nine days, after which they got into the fifth and laſt ſcouring, called the *ſtrongeſt*, becauſe it is compoſed of *all four*, that is, of that pure juice taken out of the pit, by means of the waſte-well.

This laſt ſcouring is only made when wanted; during the three firſt days add twenty-one pounds of groſs cut bark in the morning, when the hides are laid down; at night they are again laid down without any additional bark.

The hides being left three days in this *ſtrongeſt* liquor, on the fourth day they are taken out again and laid down, being firſt left to drain for three quarters of an hour; two workmen then ſtir the ſcouring, one from the ſurface to the middle, and the other from the middle to the bottom, and while they are laying down, a third flings about forty-eight pounds of groſs tan between the hides. They are then left in this liquor for eight days, and this is their laſt ſcouring.

Some tanners, fearing the fermentation of hides thus prepared by bark liquor, may be interrupted or troubled by the addition of crude water in the firſt ſcourings, have recourſe to another expedient: they wet the tan only with as much water as will ſoak it, ſo that the water may not ſwim on the ſurface: at the end of four days, they take out all the ſour, or juice, of the waſte well, and reſerve it for this ſtrongeſt or fifth and laſt ſcouring. They then water the tan again for three days, and this yields them a ſecond juice, which ſerves for the fourth ſcouring, which we have called the *ſtronger*. In following this operation for ſeveral days, they have at each a new filtration, a freſh juice more weakened, and which ſerves for the inferior ſcourings, which I have called the *dead*, the *weak*, and the *ſtrong*.

But theſe precautions are only neceſſary to ſet the ſcourings a-going, when a new operation is to be begun; when hides have been once ſcoured, each ſcouring is found to have loſt near a fifth of its ſtrength, and ſerves to form the ſcouring that precedes it for other hides; thus the ſcouring which has ſerved for the *weak*, will be afterwards employed as the *dead*; the *ſtrong* will become a *weak* ſcouring, and ſo on; ſo that at each operation they will only want the ſtrongeſt liquor, which is compoſed of the moſt ſour or moſt pure juice drawn from the pit by the *waſte well.*

It is neceſſary to obſerve, that when hides are put down into the ſcourings, the fleſh ſide muſt always be uppermoſt, that the grain, which is the moſt delicate and valuable part of the hide, may be guarded from accidents; for this reaſon the laſt hide muſt be turned fleſh ſide uppermoſt, to ſerve as a covering to the reſt.

Remarks

Remarks on the Scouring of Hides by bark liquor, called Hides of Liege.

It is neceſſary that the ſcourings ſhould be covered and clayed over, like the pits, that they may not be expoſed to the viciſſitudes of the air; this is the method practiſed at the manufacture of *St. Germain*.

When the hides have been ſome days in the ſcouring they examine them, and ſuch as are fit are touched on the fleſh ſide, and ſhaved on the grain ſide with a very ſharp knife, to take off ſuch hair as may remain, they then are put into water to refreſh, and from thence into the other ſcourings, to receive the proper degree of filling.

The grain ſhews if a hide thus prepared be well ſcoured, and if proper to be pitted, for then the grain is whitiſh or aſh coloured: whilſt it retains a yellow caſt, it is a ſure ſign that the hide ſtill wants ſcouring.

The ſame degree of ſtrength in the ſcourings is not ſufficient to fill all kinds of hides; that of an ox of four years old, is more tender than that of a more aged ox, hardened by age and by work; Tanners who put into one and the ſame ſcouring indiſcriminately all hides that come to hand are bad artiſts, and are liable to make bad leather, for if they are not equally filled in the ſcourings, the tan or bark cannot recover the fault, for the hides may remain for ever in the tan pit without effect, if they have not been ſufficiently raiſed or filled in the ſcourings, that is, if not prepared to receive the tan: if they are not thus prepared, a hard and compact ſurface will oppoſe itſelf to the action of the bark; inſtead of an open and ſoft ſubſtance, which only can be rendered good leather by the action of the bark.

If a method could be found of ſwelling the large hides of old oxen, as readily as thoſe of young, we might be ſure, that by leaving theſe old hides longer in pit than the others, they would in proportion acquire a ſuperior quality; but it is one of the great inconveniencies of the tanning trade, that the ſtrongeſt hides fill or ſwell with the greateſt difficulty. I ſhall now make ſome remarks on the nature and quality of hides prepared by oak liquor.

Another method of working the Scourings for hides prepared by oak liquor.

I ſhall avoid repetition in this chapter as much as poſſible; the method practiſed at *St. Germain* is ſimple enough, and being juſtified by long experience, it muſt be of uſe to relate it in this place; the tanner who would profit by my labour, in making theſe experiments, will be a judge of the difference and effects of theſe various methods. At *St. Germain*, twelve ſcourings are commonly uſed, the two laſt of which are *new* ſcourings; the firſt ten are thoſe which have already ſerved: each of theſe ſcourings contain twelve hides, and eight meaſures or muids of water; each muid meaſuring four feet and a half in depth, and as much in diameter.

The hides being ſhaved and waſhed, are put into the firſt ſcouring, which is the weakeſt of the whole; the taſte of this liquid is ſcarcely acid,

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when put on the tongue; it is ſomewhat rough, yet ſufficient to prepare the hides to paſs into a more ſour ſcouring; for hides muſt not be too ſuddenly attacked by the acid, before the fermentation has eſtabliſhed itſelf, or they would criſp and contract themſelves too much.

At the end of twenty-four hours, theſe twelve hides are taken up, and left to drain half an hour, or during the neceſſary time to raiſe the other ſcourings; for the exact time they ſhould be left to drain has never been aſcertained; they are put down into a ſecond ſcouring, ſomewhat ſtronger, and the water of the preceding is flung away, which having ſerved ten times, is of no more uſe.

The ſecond ſcouring, tho' a little ſtronger than the firſt, has not any ſenſible acidity on the palate; but the next appear ſtronger and ſtronger, and the twelve hides are taken up each morning, and put down in the ſucceeding ſcouring.

The ten ſcourings which the hides thus go thro' in ten days, are called *running ſcourings*, to diſtinguiſh them from the *ſettled ſcourings*, which I ſhall now deſcribe; they are new ſcourings, in which the hides remain during ten days; but before I treat of theſe new ſcourings, I muſt ſpeak of the four pits employed to make them.

At *St. Germain* they have five ſour pits, like unto thoſe in which the hides are tanned, and are well ſheltered in the tannery; I ſhall diſtinguiſh them by the numbers 1, 2, 3, 4, and 5, by calling 1 the weakeſt, and 5 the beſt and ſtrongeſt: they take up the hides raiſed by bark liquor from the third barking, and tranſport all the tan which has been taken out into the fifth ſour pit: freſh ſpring water is conveyed into it by means of a cock and wooden gutter, which reaches from the cock to the pit: this water filtrates itſelf on the tan, and falls by degrees into the waſte well, which is at one corner of the pit, from whence it is taken out at the end of three days or more: this affords ſufficient to make four ſettled ſcourings.

When the tan of this ſour pit has ſpent its ſtrength in the firſt water, freſh water is let in, which paſſing on the tan ſours itſelf, and forms a leſs ſour pit, which I ſhall call *firſt* and *ſecond*; theſe are the laſt or leaſt of the five: the middling pits, which I ſhall call *third* and *fourth*, are formed by this ſecond water of the pits *one* and *two*, which is poured on a tan which has already furniſhed a firſt water for four ſcourings, as I have already ſaid; inſtead of letting in ſpring water, they put in the liquor of the pits *one* and *two*, which by repaſſing again once or twice on this ſour pit, tho' already ſpent, yet ſtrengthens itſelf, and ſerves to make the two middling pits, *viz.* numbers 3 and 4; thus numbers 1 and 2, are compoſed of ſpring water poured on tan, which has already furniſhed its new ſcourings; numbers 3 and 4 are formed by this ſame water, poured over one or two others of the like kind, to take the remaining ſtrength out of the tan: laſtly, number 5 is the firſt water of this tan, that is, the moſt ſour and fitteſt to make new ſcourings.

The pits 3 and 4 ſerve to make the firſt ſettled ſcourings, the pits 1 and 2 ſerve to ſprinkle the others; the 5th ſerves to make the beſt ſcouring;

thus

thus eight ſcourings muſt have been taken out of a four pit, before it is ſpent and uſeleſs.

To make a firſt new ſcouring, or *ſettled ſcouring* of reſt, they not only take ſome muids of four water, but for every twelve hides they add ſix baſkets, of about forty pounds each, of groſs bark, that is, twenty pounds for each hide. To procure this groſs bark, the tan is paſſed through a riddle, to take out the powder of the bark; and there only remains that which is in little ſticks, one, two, three, and even four inches in length; this bark, which is put into the ſettled ſcouring, adds ſufficient ſtrength to it to preſerve it for ten days in a proper ſtate of acidity to fill the hides. In ſome places where the hides are put into a fourth barking for ſix weeks, this fourth barking having more ſtrength, is ſufficient to make the new ſcourings, without addition of freſh bark.

They equally put ſix baſkets full of groſs bark into the ſecond ſettled ſcouring, though it be a little ſtronger than the firſt, becauſe it has been made with water of the *fifth* four pit; the hides alſo remain there about ten days, as in the firſt, after which they are fitted for laying in pit; they are laid down with all their moiſture which they have contracted in the *ſettled* ſcourings. Some think it important to put them in immediately, that they may not be checked of the ſwelling and thickneſs they have acquired by the fermentation of theſe different ſcourings; ſometimes alſo they ſprinkle the pit with the water of the four pits or ſcourings; that the hides may preſerve as long as poſſible that ſtate of dilation or ſwelling.

In winter, when fermentation is ſlow, they are obliged to ſcour the hides in a greater number of *running ſcourings*, ſometimes twenty are neceſſary before they are fit to be put into the *ſettled ſcourings*, for if the hides were put in too *white*, the acidity of theſe *ſettled ſcourings* would ſeize them too ſuddenly, and would pucker and criſp, inſtead of ſwelling, dilating, and diſtending them.

Sometimes, even after the *running ſcourings*, they are obliged to give them a ſcouring, which is of a medium ſtrength between theſe and the *ſettled ſcourings*, and which is compoſed of half ſour water, half common water, and three baſkets only of groſs bark. On the contrary, when the hides have been heated before their arrival at the tannery, they are brought on quicker; and they give them but four or five *running ſcourings*.

Heat is prejudicial to *running ſcourings*; therefore the tannery is kept cloſely ſhut in ſummer during the day, to keep out the heat, and opened after ſunſet, that the cool night air may come in; to encreaſe this, the water of ſome adjacent brook is conveyed through it, as much greater precaution is required for hides raiſed by bark, than for barley hides.

When the hides do not come on, that is, do not thicken quick enough, they are haſtened by more frequent and ſtronger ſcourings, or elſe they are left longer in each; ſometimes two days inſtead of one.

If the place, where theſe ſcourings are made, is too hot, they will putrify and turn, or become ropy; the hides will ſoften, and grow thinner, inſtead of acquiring thickneſs and quality.

When the hides are taken out of the firſt ſcouring, which is a *dead* ſcouring, the liquor is flung out, preſerving the old bark for fuel; they waſh the ſcouring, and put in a *ſour* water to form the new ſcouring.

A *dead* ſcouring which is ſpent, and where all fermentation is extinguiſhed, will yield a clear water, if it was of a good quality; by this ſign it is known if the hide is improved; fermentation is extinguiſhed in this fluid, becauſe the *alkaline-animal* ſubſtances have ſaturated the acid of the ſcouring; for this reaſon the liquid will not appear muddy, as fermented matters generally do.

Remarks on Hides filled by oak-bark liquor.

Hides filled by oak-bark liquor; conſume a little more bark than barley hides; firſt, on account of the *ſettled ſcourings*, where forty pounds of bark is allowed for each hide; ſecondly, becauſe hides filled by bark liquor, remain longer in the pit than barley or lime hides; at the manufacture of *St. Germain* they eſtimate, that each hide conſumes between two hundred and twenty, and two hundred and fifty pounds of bark, when filled by oak liquor: that each barley hide requires two hundred and twenty-five, and thoſe filled by bark two hundred and fifty each.

The hides filled by bark are ſold at *St. Germain* from twenty to twenty-five *ſols* a pound. But we ſhall treat more at large on the price and commerce of hides, of the expences of their preparation, and the profits of the tanners.

A hide filled by bark liquor requires particularly to be well beaten, even with hammers of caſt and wrought iron, and with frequent ſtroaks: experience proves there is an aſtoniſhing difference between the laſting and goodneſs of ſoals of the ſame hide beaten, and thoſe which by the negligence of the Shoemaker have not been ſufficiently beaten. At *Bâle*, in *Switzerland*, they make leather of ſlighter and thinner hides than ours, yet they are good becauſe beaten with great force with copper hammers. As the ſhoe-makers in general will not give themſelves this trouble, it were to be wiſhed that the tanners and leather-dreſſers would beat their leather.

The hides from the *Brazils*, dried with the hair on, ſometimes ſucceed badly when filled by oak liquor; they are too hard; with great difficulty can be ſoftened and ſwelled, and are too much ſcored with the knife on the fleſh ſide; proceeding from the careleſs manner of flaying them in *America*, where nothing is ſought for but profit and reſt, without conſidering the quality or the goodneſs of the commodity. In a country, where they cut down a tree to gather the fruit, and kill oxen only for the hides, ſuch a neglect will ſeem the leſs ſurpriſing.

The *Iriſh hides* are alſo too much ſcored by the knife, certainly becauſe they are not ſkinned with proper care.

The moſt preferable hides to be filled by oak-bark liquor, are thoſe of the *Limoges*, where the

oxen

oxen are fed on radiſhes, and not fattened till well worked; they have not much tallow, but their hides have more firmneſs than thoſe of other countries, where oxen are only reared to fatten. I ſhall hereafter ſhew the great advantage of this method of raiſing hides by oak liquor.

Of filling Hides by Yeaſt.

Seeing that barley, rye, bran, bark, by producing ſour liquors, proper for fermentation, cauſed the hides to ſwell pretty equally, it was natural to think that all other ſour liquors would produce the ſame effect; this method perfectly ſucceeded by experiments made in 1749: it is probable that the ſpirituous parts contained in the lees of beer, are of proper quality; for this reaſon bakers often prefer it to raiſe their bread. We are indebted to *M. de Monteran, intendant of commerce*, for this idea, which muſt ſave expence and trouble, as the grounds of beer are a uſeleſs matter for any other purpoſe, and yet capable to produce a very good fermentation.

Grounds of beer taken hot, coming out of the boiler, are put to ferment in a cloſe ſcouring, that is, in a vat of pure water; when it is at the higheſt pitch of fermentation, ſalt is ſcattered on it, and the hides are laid in, after being ſoaked, cleanſed, and fleſhed; this ſcouring is re-heated, and the hides are taken out at ſeveral different times, until they be ſufficiently filled: and the whole operation of the beer ſcourings is the ſame as thoſe of barley or bran.

Theſe beer ſcourings may be equally made cold as I have already mentioned concerning the cold ſcourings of bran.

The preceding method compared, and the advantage of raiſing Hides by oak liquor explained.

Although no very preciſe experiments have been made on this ſubject, experience ſeems to decide in favour of the oak liquor hides, and next of barley hides; yet the limeing of hides is very ancient, and many ſelfiſh tanners are ſo much attached to it, they think it ſtill preferable, for by the report of the inſpectors, made to the board of commerce in 1746, the tanners of *Montreau* and *Pontoiſe* atteſted, that though they made uſe of barley, yet they thought lime preferable: thoſe of *Poligny* and *Franche Comté*, ſaid that barley rendered the hides ſpungy and brittle, and that it dried up the nerves. Theſe objections muſt be the effects of prejudice; for in all other parts barley hides are better eſteemed than hides raiſed by lime.

Some have inſiſted that a diſtinction ought to be made in the manufacturing and ſale of hides; to ſell for winter-wear limed hides only, that had been very long tanned, and for the ſummer ſeaſon barley hides lightly tanned; by this means, they ſay, the complaints of cuſtomers made to the ſhoemaker and from the ſhoemaker to the tanner would be avoided; being ſometimes by them reproached, that in the month of *Auguſt* their ſhoes have been burnt by a ſhort walking; at other times that two hours walking in the wet have ſoaked them for the whole winter; perhaps this difference holds good between barley hides and thoſe raiſed by bark; but as to lime, I think it ought in general to be prohibited.

Hides that are too thin, and which have little ſubſtance, and thoſe of oxen ſpoiled by hard working, or dried up by old age, do not ſucceed ſo well when filled by bark, as by barley ſcourings, after the manner of *Tranſylvania* or *Walachia*; each may be uſed, becauſe the ſoft and unctuous fermentation of the barley or rye paſte penetrates, nouriſhes, and makes ſome ſkins appear to advantage, which would have been rejected at *Liege*.

Thoſe who have learnt to tan after the *Liege* method, by oak liquor fillings, atteſt that it is as much beyond the barleyed hide, as this laſt is ſuperior to the limed hide; and that the public would reap a much greater advantage from hides filled by bark liquor than from any other, becauſe in its preparation there neither enters lime or any other ingredient to alter its quality; the general reputation theſe hides have throughout *Europe* ſeems to prove the ſame. By a report from the tanners of *Brittany* 1756, it appears they were all convinced that the filling of hides by bark was preferable to that by lime; but none dared to undertake it before the tanners of *Paris* and of the neighbouring provinces had ſet the example.

Leather filled by bark is ſaid to be very good for pumps in dry weather and dry countries; but many ſay that it is not ſo good to wear in the wet as the barley leather; this ariſes from the preference which each gives to his own method of working: leather made by oak liquor is but little uſed in *France* as yet; for that reaſon alone, it may find detractors. But, if we call reaſon to our aſſiſtance, we may very eaſily conceive that leather prepared with an aſtringent matter, muſt be better than leather prepared with farinacious, unctuous, and emollient ſubſtances, ſuch as barley and rye; thus I think, that according to the phyſical part of this proceſs, hides raiſed by oak liquor muſt be the beſt.

In ſhort, this preparation of hides is leſs expenſive, ſince it requires nothing but bark which has been uſed, and unfit for any other purpoſe, but manuring lands or burning: and it appears a national object to eſtabliſh it in preference to all others, on account of the conſumption of grain which the barleyed hides require; inſomuch that M. *Doublet de Perſan*, when *Intendant of Commerce*, uſed all his endeavours to eſtabliſh it, and it were to be wiſhed that this method generally prevailed.

On this occaſion I cannot help relating a fact, which thoroughly proves the reputation of hides raiſed by bark; a perſon in office, and worthy of credit, aſſured me, that on a rumour of the eſtabliſhment of *Liege* or barked hides, the ſhoemakers at *Paris*, fully convinced that the conſumption would diminiſh, took the alarm, and employed many ſollicitations to put a ſtop to this innovation; a proof of the value they ſet on this kind of leather, and of the fears they entertained of ſeeing the public wants too ſeldom renewed for the future.

All that has been objected againſt this method is, that it requires an extreme attention, and that it ſometimes fails by the viciſſitudes of the air alone: they ſay beſides, that it requires a particular kind of water ſuch as that of the *Meuſe*, and therefore could not every where equally ſucceed; yet ſpring waters in general are nearly of the ſame quality; the ſpring of the manufacture of *St. Germain* ſucceeds wonderfully, and we hear no more of thoſe frequent loſſes ſaid to ariſe from hides filled by bark.

In 1749 a tannery was formed at *Bayonne*, authorized by letters patent of the 16th of *May* 1749, for the dreſſing of ſtrong hides after the manner of thoſe in *England*, *Liege*, and *Namur*: this manufacture ſucceeded, and the *Spaniards* preferred theſe hides even beyond thoſe in *England*, from whence they were accuſtomed to get them.

This ſucceſs encouraged certain merchants of *Toulouſe*, to form a like manufacture at *Lectoure* in 1751; they obtained from the king a piece of waſte-ground, and the inhabitants gave them the uſe of a public fountain; and they obtained a decree of council in 1754, calling it a royal manufacture, and exempting their chief workmen from ſerving in the militia for twenty-five years: it was alſo enacted that hides coming to them from foreign parts ſhould be free from duty, and that thoſe hides which they manufactured ſhould be exported duty free. In fine, the great manufacture of *St. Germain*, is as univerſally known, as ſucceſsful; and at theſe places all the hides are filled by bark, which proves the ſuperiority of this method. In 1746, twenty hides were ſent to *Paris* from *Corbeil*, raiſed and tanned after the method of Monſ. *Teybert*; the maſter-ſhoemakers of *Paris* were ordered by the miniſtry to inſpect theſe new hides; ten ſhoemakers being aſſembled, having examined them, agreed upon the following report.

Firſt. That the ſix called the *Tranſylvanian* hides were good, very well manufactured and the beſt of the whole.

Second. That of the fourteen others called *Walachian* hides there were ſeven good and ſeven bad, and that the defect of the latter aroſe from the quality of the ſkins and not from the tannage, which was perfect.

Third. That the *Liege* or *bark-filled hides* appeared to them in general to be preferable to the *Walachian*, becauſe the more the firſt is wore, the more it hardens; whereas the *Walachian* leather is hollow, and loſes by being kept.

Fourth. That the *Tranſylvanian* appeared to have the advantage of the *Liege hide*, but that appearances being often fallacious, they muſt refer to *wearing*, and experience.

Hides filled by bark are not in general as thick as barley hides; ſuch ſhoemakers who think that the thickneſs of a hide form its merit, would be deceived in appearances. The hide raiſed by bark is the ſofteſt; a whole hide may be rolled as a thin cow-hide; it may be beat for ever and will never extend under the hammer; cut a piece of any figure in the middle of a *Liege hide*, or hide *filled* with bark; beat it as much as poſſible; it becomes thinner and more compact, but it always preſerves its length and breadth, and being applied to the place from whence it was cut out, it will not have ſpread under the hammer, but will exactly ſit the ſpace again, which a piece of barley or lime hide would not do.

Limed hides or hides raiſed by lime, are known after being tanned, by a blackiſh colour on the grain ſide, red on the fleſh ſide, and reddiſh in the cut. The barley hide has a ſleatiſh colour on the grain ſide, whitiſh on the fleſh and cut.

Of the Daniſh method of Tanning Hides.

This method of tanning which is practiſed in ſeveral places, and in particular in *Brittany* conſiſts in the tanning of hides in the ſpace of two months, by ſowing them round and filling them with bark. After the green hides are waſhed from the filth and blood, or if dry hides, ſteeped, ſoftened, and the ſalt taken out, they give them a new pit to make the hair fall off; one month ſuffices for this, the hides are then poliſhed, fleſhed, worked at the river, and put into a *red-binder* as barley hides are.

When the hides have taken the *red,* they are then to be tanned; for this purpoſe they are ſowed round like ſacks or bags, leaving only one ſide open, by which they are filled with bark and water, after which they are intirely cloſed up and well beaten, that the bark may be equally diſtributed throughout the whole; they are then put into pits filled with good tan water, ſo that the hides be totally covered, and may not grow black.

Theſe *Daniſh* pits are from eight to ten feet in length, by four feet in breadth, and as much in depth; the hides being laid down, are ſtrongly loaded with planks and ſtones, to force the bark juice contained within, to penetrate ſtronger and quicker; that the preſſure ſhould be equal and the tanning the ſame, they are turned three or four times a week, and carefully beaten each time: by this method, hides are tanned in two months, and with one barking; nevertheleſs it muſt be owned that this one barking is pretty near equivalent to the three that are made uſe of in the common method, when the hides are laid in pit.

The hides prepared after this manner are thinner than hides tanned in pit, becauſe they are leſs ſwelled or filled, and the internal weight with which they are loaded, continually dilates and extends the hides; they are more ſupple and pliable than common leather, ſomewhat like cow hides, or ſmalleſt ox hides; it has the colour of upper-leather; that is, a clearer colour than ſtrong leather; but it may be made darker with lime water after being tanned.

In the borough of *Locmine* in *Brittany*, there are above forty tanners who in general follow this method of tanning, which they perform in two or three months: there are alſo twenty-eight tanners at *Pentivy*, who follow the ſame method, and they call it *tanning after the Daniſh manner*; this method ſeems better adapted to thin hides, than to ſtrong ones, and there are ſome provinces in *France* where they work the thin hides after this *Daniſh manner*: in ſhort this method has ſuch an affinity with the *Engliſh* tanning, it ought not to be proſcribed, but encouraged and perfected, by paying more attention to it than has hitherto been done, and by filing the hides better for this kind of tanning.

Of

Of thin Hides.

Cow hides, or ſmall *ox* hides, which are not fit to make ſtrong work, ſerve to make inward ſoles, womens ſhoes, upper leathers, and other works leſs hard than thoſe in which ſtrong hides are employed; cow ſkins are cloſer than oxen, and if they had ſufficient thickneſs, would have the preference; but they commonly ſerve to make the weak leather.

At *Paris* they call theſe thin hides, *working leather*, (*Cuirs à oeuvres*) becauſe the leather-dreſſers uſe it for ſeveral works, whereas ſtrong hides are not ſuſceptible of ſo many different forms; ſome call a thin, compact, and well tanned hide, fit to make ſoles for pumps, *Baudrier*, *Brigady*, and *Semelin*.

The *Baudrier* or thin hides remain in the lime pits but half the time allowed to the ſtrong hides; theſe very thin hides are not filled by oak liquor, even in thoſe tanneries where this method is made uſe of for ſtrong hides. When taken out of the lime pit they are well worked in the river, that is, they are fleſhed, and ſtrongly drained on the beam, both on the grain and fleſh ſide, four or five different times, and are rinſed each time to take off the lime; they are then put into the binding for eight days, and afterwards pitted for the ſpace of four months only, that is, one-fourth of the time requiſite for a ſtrong hide.

In *Dauphiny* they make uſe of the *Daniſh* method to tan the *Baudrier* or thin hide, and it ſucceeds perfectly, becauſe as they do not require the thickneſs of ſtrong hides, and the *Daniſh* method tending to diminiſh the thickneſs, is not ſo good for ſtrong leather. When theſe hides have been *pitted* two months, they are put into the binding vats for ſeven or eight days; they are then ſewed up like bags, and filled with the binding liquor of the vat and with the bark which has boiled in it: they are thus left filled for eight or ten days, and are ſhifted five or ſix times a day; they are unſewed, and laid on the flat, in layers in the vat, with the ſame bark, and left for eight days without ſtirring; they are then taken out, dried on poles, and fitted for the leather-dreſſer.

In *Breſſe* and the adjacent provinces, the thin ox hides, cow hides, calf ſkins, and other ſmall ſkins fit for upper leathers, have but ſix weeks of the lime pit in ſummer, and two months and a half in winter; they are left for three days in running water, during which they are alternately worked with the knife and the ſtone, ſeven or eight times each day, until no lime comes from them, and the water comes clear.

The river work being finiſhed, they are put into a vat with tan water, ſtirring them well ſeveral times a day to make them get a *grain*; but it is not always neceſſary to *grain* the upper leathers; and when treating of the leather-dreſſer or currier, I ſhall ſhew the difference between the turned calf and the oiled calf; thoſe which they intend for the grain to, that is for the grain to be on the outſide, principally require the binding vat.

At *Limoges*, calf-ſkins remain four months in lime and three months in pit with oak bark, or two months with the bark of the *Rhus Myrtifolia* or *Roudou*, as before deſcribed. In *Dauphiny* they remain but a fortnight in lime; but they are afterwards put into the vats with two different barkings for one month, and laſtly in *pit* for ſix weeks. At *Metz* and *Verdun* cow hides remain eight days in a dead pit, eight days in a new pit, one month in vats with water and bark, and five months in pit with two different barkings; the cow hides make the black ſmooth leather for the top of coaches: as to calve-ſkins, it is the ſame preparation, except that they are not laid in pit but once during the ſix weeks. At *Bourges* the cow hides are three months in lime, and ſix months in pit. At *la Souteraine*, and at *Saint-Julien*, they are three weeks in lime, five or ſix days in wheaten bran, and fifteen days in a binding liquor of hot water, with bark.

At the manufacture of *St. Germain en Laye*, cows and ſmall ox hides, after being cleanſed, drained, poliſhed, fleſhed, and worked in three *dead* pits, and one *live* pit, paſs through the river work with great care, at five different times. At the firſt operation the ſkins are put on the wooden beam, and cleared with the double handled knife, that is, they are ſtrongly preſſed to make the lime come out; then they are fleſhed with a two handled round knife, and the hides are flung into the water to refreſh.

At the ſecond operation, the hides are again put on the beam, and the ſtone ſtrongly paſſed on the grain ſide to ſoften it, to unite it, and make the lime come out, and they are then again flung into the water.

For the third operation, the hides are again put on the beam, and the round knife ſtrongly paſſed over them, as well on the fleſh as on the grain ſide, to preſs out the lime the better, after which they are caſt into the river.

For the fourth and laſt operation, the ſame is repeated; and that is called *draining* and *watering*; if no more lime remains in the ſkins, and that the water comes out clear, they are put into the vat.

Of the binding Vat.

The *binding vat* is an aſtringent water, in which the cow and calve-ſkins are ſtirred for a long time, and in all directions, to ſtrengthen and tan them. Oftentimes four men, or more, are employed in this work.

At *St. Germain* theſe *binding vats* are four feet high, and ſix feet diameter; they are made of wood, and hooped with iron; the ſkins are laid in with tan and hot water; four of the ſtrongeſt men keep them continually ſtirring with ſhovels, from right to left, for one hour. Into each vat containing twenty-four cow hides, they put five baſkets of tan; theſe baſkets are twenty inches in diameter, and thirteen in height.

This *binding vat* work is ſeveral times repeated, taking the ſkins up each day, and draining them, before they are laid into the vat: whilſt the ſkins are draining, a little freſh tan is added to the vat, to give it ſtrength.

When all the ſkins are turned over, they are left to *refreſh*, and go through the ſame operation with freſh tan, till they are laid into the firſt barking. For this refreſhment of twenty-four cows and twelve dozen of calve-ſkins, they add twenty-two baſkets of tan, viz. ten for the cows and twelve for the calve-ſkins; for the repaſſing or *refreſhing* require double the quantity of the *vatting*.

This refreſhing is done in a vat in which the hides are extended at their full length; if the ends are by any means doubled, tan is put on the folds, and incloſed in freſh tan, wetted with a quantity of cold water, and thus they remain a month or ſix weeks, according to the ſeaſons: when they are taken out of the repaſſing or refreſhing, they are laid in pit as uſual, but they require but two barkings, becauſe the *vatting* or *refreſhing* ſtand inſtead of a firſt barking.

Cow and ſmall ox hides, after the *binding vat* and repaſſing, are laid down in *pit*; they are wetted with water; the ſofteſt are the beſt, and care muſt be taken they do not want it: at the end of three months, they get a ſecond barking for five or ſix weeks; and after the ſecond barking, they are brought to the drying-place; they are there extended on perches, care being taken that the heat or cold does not ſeize them too ſuddenly: in this ſtate they are ſaid to be in *cruſt*, and are ſold to the leather-dreſſer to make pump ſoals, black-grained leather, ſmooth leather, red cows, *Ruſſia* leather, for ſaddlers, harneſs-makers, trunk-makers, &c. I ſhall deſcribe them more particularly in the chapter on leather-dreſſing.

Cow hides, but eſpecially heifer hides, being moſt compact, are beſt for outward ſoals; they are preferable to ſmall ox-hides, which ſerve for the firſt or inward ſoals. Cow hides well worked generally paſs for the beſt of leather, when well choſen; the heifer is beſt, becauſe, if the cow has had a calf, the ſkin is more diſtended and thin: ſoals taken from a good cow hide, eſpecially from the back, ſhoulders, and rump, are better that oxen: there are cow hides which weigh green ſeventy-five pounds, and twenty-five or thirty when tanned; but I muſt own they are ſcarce, ſo that the name of cow-hide is given by leather-dreſſers to all weak hides of oxen, cows, or calves. With reſpect to the refuſe of a cow hide, ſuch as the belly or other weak parts, they are not equal to thoſe of an ox hide.

Of the working of Calve Skins.

Calve ſkins undergo pretty near the ſame operation as cow hides; they are paſſed in three *dead* pits and one *live* pit, with this difference, that calves being more delicate than cows, they are not laid into the pit until cow hides have been firſt paſſed in it.

When the ſkins are not green, but ſalted or dry, they muſt be trampled to render them ſoft.

The river work for calve ſkins differs ſomething from cow hides; for from the ſecond operation, fifteen or eighteen are put into a tub, where four men, with long wooden handled peſtles, ſtamp them for half a quarter of an hour, to break the nerves, and ſoften them This work is repeated after each operation, that is four times, as well as the river work.

When neither hair, fleſh, or lime, remain on the ſkins, and that the water comes off clear, like cow hides they are put into the *binding vat*, and turned at ſeveral times, ſtill more than cow hides, in different ways, and each time new tan is added.

The *repaſſing* of calve-ſkins continues about a month: they are placed in the vat with a little tan between each ſkin, and on the ſurface a little tan, and ſome of the *binding water* of the vat: it is in this *repaſſing* they continue until put into pit.

To *pit* the calve-ſkins, they are folded lengthways, but unequally, and tan is put into the folds; a little more is put on the head, and towards the rump, theſe parts being thickeſt; the tan muſt be reduced into very fine powder.

The firſt barking laſts three months; then they are taken out, cleanſed, and beat, to take off the firſt tan; they then are laid into a ſecond barking, obſerving alſo to fold them unequally, but after ſuch a manner, that the part which was not doubled in the firſt barking, be doubled in the ſecond; very fine tan is put between the ſkins, the ſofteſt water that can be poſſibly procured is poured on, and great care muſt be taken that they do not want it whilſt they remain in the pits: this ſecond barking continues three months, after which they are ſent to the drying loft.

At *Paris*, where the tanner and leather-dreſſer are two diſtinct trades, and jealous of their rights, the tanner has no more to do with his calve-ſkins, when he has taken them out of the ſecond bark, except to prevent their drying; ſo that he does not bring them to the drying loft, but ranges them on the edge of the pit with all their tan, in piles of five or ſix dozen; there they lie between two moiſtures, till the leather-dreſſer buys them to dreſs them in oil, and to prepare them for different uſes.

About twenty years ago, ſome tanners ſucceeded in tanning calves and ſheep-ſkins in bark with hot water; I am ſure it muſt have a good and a ſaving effect, by making the ſame quantity of bark go farther, as I have already obſerved on the ſubject of ſtrong hides.

Of Goat and Sheep Skins.

Goat ſkins are not ſo common as to be had green in a ſufficient quantity for a continued work, they are therefore bought in the hair dry, they are caſt into the river to be ſoftened, and trampled when taken out; they go into three dead pits, are poliſhed, and paſſed in the live pit like calve-ſkins.

Such goat ſkins as are tanned, require at leaſt ten operations in the river working, being themſelves dry in their nature; I ſhall ſpeak of it more at large in a treatiſe on *Morocco Leather*; for the river work is there obſerved with greater attention; and there is likewiſe this difference, that goat ſkins are worked in the river inſtead of tubs, except in the laſt operation, where tubs are uſed for the greater neatneſs. The hair of goats and calves is kept: goats hair (when grey) is ſold for eight or nine livres the hundred weight, and for fourteen or fifteen when white. The pairings of the fleſhings both of goats and of calves ſerve to make glue.

Goat ſkins go into the binding vat; they afterwards remain fifteen days in repaſſing; coming out of which, they are laid in pit once only; not being ſufficiently thick to require a ſecond barking.

It is in ſpring particularly that cow, calf, and goat ſkins are taken out of the pit; whereas ſtrong hides are taken up in *Autumn*, being the ſeaſon for ſhoemakers to lay in their winter ſtock.

Sheeps leather, or *Baſil*, is a ſheep's ſkin tanned; and theſe remain but three weeks or a month at moſt in the lime pit: if pits are made for this uſe alone, ſix quintals of lime are required for twenty dozen of ſkins. When the ſheep ſkins are peeled, they require no more than fifteen days in the lime pit. After they are ſufficiently filled, they are put into the cold binding vat, and there left for one month.

There are provinces where ſheeps leather is made after the *Daniſh* method, that is, they are ſewed all round, and filled with bark, and put into a new vat very hot, which is ſtirred from time to time, re-heated two or three times each day, and in two days the ſheep ſkins are tanned.

Of Horſe Hides.

I have ſaid that horſe hides are not worked by the tanners at *Paris*; thoſe in the country are not ſo nice; they do it when occaſion offers; they give them ſix weeks liming, and five months pit, pretty nigh the ſame as cow hides; they are ſold at eight or nine livres. A horſe hide is known by the length of the neck, having a great thickneſs on the main, and very ſtrong wrinkles: they are only uſed for firſt ſoals, which do not require ſo good a quality as outward ſoals.

Of the defects which are obſervable in Hides.

Bad leather is often owing to the bad quality or nature of the hide, and ſometimes to the defects in the preparation: I ſhall run over the different cauſes of theſe defects in a few words.

It has been already ſhewn, that there are certain hollow, thin, dry ſkins, which are filled with difficulty, and conſequently muſt be badly tanned. There are alſo ſkins cut and gaſhed with the knife by neglect of the butcher in flaying them; the large hides from the *Brazils* and *Ireland* are chiefly faulty in this point.

In ſheep ſkins, the diſeaſes incident to thoſe animals often deſtroy their tender hides.

Some hides are pricked and flawed by muddy waters, or ſuch as are loaded with acrid particles: there are ſome where the heterogeneous particles remain in the depilation: theſe hard parts reſiſt the knife, and cauſe the cutting or gaſhing of the hide in the working on the beam.

Some hides are burnt by lime to ſuch a pitch as to tear under the pincers, or under the knife uſed in fleſhing; this is an evident proof of the danger and abuſe of uſing lime; againſt which I have already largely expatiated.

The bad quality of the bark, or of the tan, contributes alſo to that of the hides: old bark, full of crevices, covered with moſs, blackneſs, or whoſe fire is extinguiſhed by the moiſture it has contracted, forms a bad tannage: the ſame holds good if the pits are not ſufficiently watered: for the parts of the tan cannot penetrate the hide, if they are not diſſolved ſo as to penetrate and ſoak into the hides.

The quality of the water greatly influences that of the hides, particularly during the ſcourings: the water of the river of the *Gobelins*, is ſo hot, flat, inſipid, and almoſt corrupted, that at the manufacture of *St. Hippolyte* they are obliged to fetch two or three turns from the *Seine* each day.

The tanneries of the ſtreet called *Cencier*, being lower down the river of the *Gobelins*, have water which brings down the ſkins better, and is fitter for ſoft work, that is, for calf and goat ſkins, and the work is carried on much faſter; ſix hours of water in the aboveſaid ſtreet, does almoſt as much as twenty four hours at *St. Hippolyte*, which is only three hundred fathoms diſtance, becauſe in this interval the river hath loaded itſelf with a quantity of animal particles which diſpoſes it to fermentation, and which it receives by paſſing through the different habitations of tanners, ſkinners, and dyers, with which this river is covered.

But as barley hides on the contrary require a harder and ſtronger water, the water of the river of the *Gobelins* becomes better at *St. Hippolyte*, and even there they are obliged to fetch water from the *Seine* at a great expence, to mix with that of the *Gobelins:* for the ſame reaſon hides raiſed by bark, which require a ſtill ſtronger water, would not ſucceed on the river of the *Gobelins.*

By inſpecting a hide raiſed by bark, it is known whether it be of winter or ſummer manufacturing; the ſummer hide is not ſo firm, becauſe the ſcourings corrupting too ſoon, flatten and ſoften the hide, inſtead of dilating it: a freſh proof of the choice one ought to make of a freſh, quick, and pure water, for hides filled by bark.

Froſt ſoftens the nerve of the hide, therefore all tanners endeavour to preſerve the hides from it, which they intend to keep in full ſtrength; therefore, when they have ſea-calf ſkins, or other ſkins, which are very difficult to ſoften, they are long expoſed to froſt: this ſoftens and diſpoſes them to be worked. I have ſhewn the effect of froſt on ſcourings of barley; there the danger does not extend ſo far as to hurt the hides, but only to render the ſcourings uſeleſs.

They ſay a *hide* is *horny*, when certain parts of the hide, not ſoftened in the preparation, have not been penetrated by the tan, and have remained dry and hard like *horn:* this would be the general defect of all green ſkins, if the preparation was neglected, and they were left to dry of themſelves in the air: the rounds of ſpectacles, and other common works, are made of horny leather; but is not uſed in thoſe mechanick arts which require great ſtrength and ſuppleneſs in the leather.

There are hides that have ſmall imperceptible worm holes, which render a hide very defective. If ſuch leather was on the top of a coach, the water would penetrate and rot the inward part of the carriage; therefore great care and attention is to be given to this by the leather-dreſſer; and that which is the moſt entire, moſt perfect, and largeſt, is the fitteſt for that work.

Hides gaſhed with the knife on the fleſh ſide are very common, owing to the negligence of the butchers, as I have already ſaid: to remedy this, they trim it on the fleſh ſide, that is, they ſhave off a part of the hide with the knife; but if the cuts be deep, and it is neceſſary to ſcoop, ſo as to approach the nerve of the ſkin, the ſtrength of the leather is too much affected.

The grain of the leather is alſo ſometimes damaged by the filling, by the taking off the hair, and by the river-work. When the grain is cut and damaged, the ſhoe-maker ought to put the fleſh ſide outward, and the grain inward, for the fleſh will keep it a little from the moiſture; whereas, if the grain be put outward, as ſoon as that is worn, nothing will remain to defend the reſt of the ſoal, and the leather will take the water with the greateſt facility.

The ſhoe-maker ought to make uſe of the belly, neck, and part towards the legs, they are weak parts, at leaſt for work that requires ſtrength; if the leather was ſoaked and beaten before it was worked, it would be much more durable.

Of the Making Tan Turfs.

The tan, or old powder of bark, taken from the pits after the hides are tanned, ſerves thoſe who *raiſe* or *fill* hides by bark, to make their *ſour liquors*, *ooze*, or juice of bark: but to thoſe tanners who *fill* by lime and barley, it only ſerves for fuel; and to uſe it with more conveniency, it is made into turf.

The turfs in *France* are cylinders of five or ſix inches diameter, and of two or three inches in height, made of tan kneaded in a mould, and dried in the ſun, upon thin ledges placed about the drying loft. The moulds are made of braſs, on which a man tramples, to harden the tan.

In *Provence* one man makes about one thouſand per day, for which he is paid thirty *ſols*. At *Paris* they make more; but they are ſmaller and leſs compact. The tan turfs in *Provence* coſt three livres the thouſand, including making, laying, and carriage, and they ſell them for ſix livres, ſo they have but three livres profit for every thouſand of tan turfs. A tanner, who conſumes two thouſand livres worth of bark, does not make fifty thouſand tan turfs; worth about one hundred and fifty livres; ſo it is evident, that the tan turfs only return about one thirteenth part of the firſt coſt of the bark.

At the tannery of *St. Germain*, they make about four hundred and fourſcore thouſand tan turfs *per annum*; but the greater part is conſumed in the houſe: this is the produce of about eight thouſand puncheons of tan, each puncheon two hundred weight. But the greateſt part of their tan does not go to turfs, as they give their workmen the larger pieces of bark for their profit: this groſs bark, when dry, is very good to burn, and as it could not be made into turfs, they carefully pick it up at the emptying of the pit, and of the dead workings, in which there is a great quantity.

Another uſe the tan is applied to when not made into turfs, is for the gardeners; they buy it ſometimes at ſix livres the cart-load, for beds, and hot-houſes, as it preſerves a gentle and conſtant heat, ſuch as is required for the exotic plants of *Africa* and *South America*.

According to the following calculations, the tan of fifty hides, reduced into tan turfs, produces twenty livres clear, and the firſt coſt is three hundred and thirty-ſeven livres, ſo that the tan produces only the ſeventeenth part of the price of the bark.

Of the Expence and Profit of Tanneries.

N. B. *The following calculations being made in French weight and money, it may not be amiſs to advertiſe the Iriſh tanner that one hundred pounds French, makes* 108 *pounds Engliſh averdupois. One ſhilling Engliſh is equal to* 22 *ſols,* 10 *den. and* $\frac{2}{7}$. 1 *French livre conſiſts of* 20 *ſols; each ſol* 12 *deniers Paris,* *and 15 den. Tournois. One penny ſterling is equal to 13½ deniers Tournois: ſo that the Engliſh pound ſterling is equal to 13 livres, 6 ſols, 8 den. of French money, ſuppoſing the exchange to be on the foot of 54 pence ſterling, to a French crown of 60 ſols Tournois.*

The detail I am now entering into concerning the œconemical part of tanneries, is chiefly taken from the report of M. *Guinard*, *inſpector of the tanneries*, in 1750, to the council. There may be articles which perhaps at this time may vary, but it is difficult for one not of the profeſſion to know thoroughly ſuch minute details; beſides from one province to another there may be great varieties; the following calculations will ſerve as a model or example of the method of making ſuch like eſtimates.

A tanner who in our province has two pits of ſeventy-five hides each, and manufactures one hundred and fifty ſtrong hides yearly, muſt have three workmen, which will coſt about twenty-four ſols a day each; he muſt expend for bark 2000 livres; it is certain with that quantity he may tan more thin hides, which may encreaſe the profit: but we will only examine the expence of the ſtrong hides.

Of Hides filled by Lime.

EXPENCE. I ſuppoſe a lot of fifty large hides, green from the butchers, weighing at a medium 80 pounds each, the prime coſt will be 24 *livres* each, the ſum total makes 1200 livres; the intereſt of which, at ſix per cent. for two years, is 144 *livres*;

the price of tan 337 *livres*; the workmanſhip at the rate of 16 *ſols* for each hide, 40 *livres*; lime, 15 *livres*; the total expence will then amount to 1736 *livres* for fifty hides.

PROFIT. The fifty hides, which weighed in the hair, and whilſt green, fourſcore pounds at a medium, loſe commonly about half in the dreſſing, and ſeldom weigh more than forty-four pounds a hide when tanned; therefore fifty times forty-four pounds, makes the total weight twenty two quintals of tanned leather, (each quintal one hundred pounds) which valued at 16 *ſols* per pound, will produce for the amount of the ſale, 1760 *liv.*

There are alſo ſome profits on ſmall articles, as on one hundred horns, which commonly are worth 8 livres, one half for the men, the other for the maſter, 4 *liv.*

The tail hair, 6 *liv.*

Two hundred weight of hair, at 4 livres the quintal, half only belonging to the maſter, 4 *liv.*

The fleſhings and pairings of theſe fifty hides, make fifty pounds of common glue, bought by the paper-makers, at 10 livres the quintal; deducting the waſhing and drying, we may allow for this 50 pounds of glue, 4 *liv.*

The lime uſed for theſe fifty hides, being the ordinary lime for foundations, or for manure, will produce 4 *liv.*

The tan of theſe fifty hides made into turfs for fuel, or ſold for manure, or for the gardeners uſe, will produce, 20 *liv.*

The total of theſe ſmall articles amounts to 42 livres, which being added to the product of the principal ſale, makes 1802 livres. Now we have ſhewn that the expenditure was 1736 livres, ſo that the profit of theſe fifty hides, *raiſed by lime*, will be 66 livres only; which is much leſs than the profit accruing from barley hides, which I ſhall hereafter prove to be 211 livres in fifty hides.

Of hides after the Daniſh *manner.*

EXPENCE. The workmanſhip of fifty hides, done after this manner, coſts leſs, becauſe it is ſhorter than any other way: it may be valued at 12 ſols each hide, which in the total makes 30 *liv.*

A *new* pit, which requires 2 barriques of lime, at 3 livres 10 ſols the barrique, will coſt 7 *liv.*

The *red* and *barking* will conſume one hundred and fifty quintals of bark, at 2 livres and 5 ſols the quintal, 337 *liv.* 10 *ſols.*

The coſt of fifty hides in the hair, at 24 livres each, 1200 *liv.*

The intereſt of the money may be here omitted, becauſe of the ſhort time it takes in its return; ſo that the total diſburſement is 1574 *liv.* 10 *ſols.*

PROFIT. The fifty hides which weighed eighty pounds when green, will only weigh forty when tanned. Hides thus prepared, being lighter than when done after any other manner, becauſe they are thinner, drier, and leſs ſwelled or nouriſhed; ſo that the total weight of theſe hides, at 16 ſols the pound, will produce 1600 *liv.*

To which muſt be added the ſmall articles, as before, 42 *liv.*

Total value of fifty hides, made after the *Daniſh* manner, 1642 *liv.*

Deducting the prime coſt and expences, 1574 livres 10 ſols, there remains for the total gain 67 *liv.* 10 *ſols.*

Almoſt equal to that of limed hides; but this return comes about three times oftener, and conſequently becomes three times more profitable, if at the ſame time it is ſuppoſed, that hides thus prepared, are as good as limed hides, and may have as quick and conſiderable a ſale.

Of Hides raiſed or filled by Barley.

EXPENCE. The workmanſhip of fifty barley hides, is equal to that of limed hides, rated at 16 ſols each hide, 40 *liv.*

Half a meaſure of barley for each hide, at 14 ſols; for the fifty hides 35 *liv.*

The *red binding* of fifty hides takes two *quintals* of bark, which may be valued at 45 ſols a quintal, 4 *liv.* 10 *ſols.*

The tan ſufficient for the pit, pretty nigh that of limed hides, 337 *liv.* 10 *ſols.*

Prime coſt of the fifty hides, at 24 livres each, 1200 *liv.*

The intereſt of this ſum for the year, at 6 per cent. 72 *liv.*

The total expence is then 1689 *liv.* which makes 33 livres 15 ſols for each hide.

PROFIT. The fifty hides, weighing each fourſcore pounds when green, will only weigh forty-four pounds when tanned; which will produce, at the rate of 17 ſols per pound, 1870 *liv.*

The ſmall profits of 4 livres for the horns, 6 livres for the hair, and 20 livres for the tan, come to 30 *liv.*

Therefore the total of the produce of fifty barley hides is 1900 *liv.*

And the profit of the tanner will be in one year 211 *liv.* a ſum exceeding the limed hides by 145 livres; for it is ſuppoſed that barley hides are ſold at a *ſol* more, being of a ſuperior quality to that of the limed hides; beſides, the intereſt of the money is only loſt during one year for barley hides; whereas it is loſt, at leaſt for two years, to thoſe who manufacture limed hides. The profit of hides raiſed by bark is yet more conſiderable.

Of the preparation of Hides after the method of Walachia *and* Tranſilvania.

Hides of *Walachia* being prepared by *warm ſcourings*, we muſt add the expence of fire, which in ſome places is conſiderable: a little ſalt muſt alſo be added to the ſcourings: in ſhort, according to M. *Guimard*, it is ſomewhat more expenſive than the common barley hides, but the difference is not very conſiderable.

The ſame may be ſaid with reſpect to the *Tranſilvanian* hides: rye in grain weighs eighteen pounds a buſhel *Paris* meaſure; and it requires a little more than a buſhel for each hide, which amounts to 15 ſols; ſo that it coſts as much for *rye* as for *barley*.

Of Hides prepared by oak bark liquor, called Hides of Liege.

Hides prepared after the manner of *Liege* require neither fire or barley, which makes a conſiderable ſaving; the workmanſhip may be ſuppoſed ſomewhat dearer, becauſe it requires more ſkill and attention.

EXPENCE. The labour of hides filled by bark is about 20 ſols each, ſo that a ſet of fifty hides comes to 50 *liv.*

The bark groſsly ground, which is uſed in the laſt of the twelve *common ſcourings*, and in the *extraordinary ſcouring*, may in the total be three quintals; which at about 2 livres 5 ſols the quintal is 6 *liv.* 15 *ſol.*

Theſe fifty hides tanned in pit, according to the preceding methods will require 150 quintals of bark, which at the rate of 2 livres 5 ſols each, will coſt 337 *liv.*

The price of fifty hides in the hair at 24 livres each 1200 *liv.*

The intereſt of the 1200 livres during the time of the manufacturing, which is one year, at 6 per cent. 72 *liv.*

Thus the total of the expence is 1666 livres, inſtead of 1736 livres, the expence of the limed hides.

Profit. Fifty green hides ſuppoſed to weigh eighty pounds, will only weigh forty two pounds when tanned, total 2100 pounds at 18 ſols the pound, which is the loweſt price it will bring 1890 *liv.*

N. B. At *Paris* and at *Nantes* theſe hides commonly ſell for twenty and twenty-two ſols a pound, if the hide be large and ſtrong.

One hundred horns, which are generally ſold at 8 livres, half of which only come to the maſter, 4 *liv.*

The hair of the tails of theſe fifty hides, 6 *liv.*

The hundred and fifty quintals of tan which comes from theſe hides, produce 20 *liv.*

The total of the product is then 1900 *liv.*

And the profit 254 livres, which makes more than 15 per cent of the principal ſum of 1666 livres.

In this laſt I have allowed nothing for hair and cuttings. M. *Guimard* ſays, that the hair of hides raiſed by bark is not good; whether it be that it rots ſooner than hair limed, if neglected to be waſhed and dried; or whether it be that the lime gives it a better quality, I know not, but it is worth making experiments in this matter. The pairings of hides raiſed by bark are not fit for glue, becauſe they are too fat; but they might ſerve to feed large dogs, and their fat ſubſtance might alſo be taken off to fit them for glue, by laying them ſome time in lime.

According to theſe calculations made by the *inſpector of commerce*, a tanner who manufactures a thouſand *Liege* hides of forty eight pounds, at 22 ſols the pound, would gain on each 8 livres, 9 ſols, and in the ſpace of fifteen months 8400 livres profit, without the glue, horns, hair, and tan, which muſt yield at leaſt 600 livres more.

The 600 livres in ſmall profits are, according to this *inſpector*, thus; for horns of 10 livres the hundred weight, 200 *liv.*

Fourſcore quintals of hair, at three livres the hundred weight, which makes 240 *liv.*

Five thouſand tan turfs, at 10 livres the thouſand of which fifteen ſols muſt be deducted for the making 154 *liv.*

The parings of one thouſand hides, at 12 livres the hundred, and which weigh above two ounces each, 18 *liv.*

Five quintals of ears and fleſhings, at 3 livres the hundred, 15 *liv.*

Total of the ſmall profits 627 *liv.*

Added to the former produce of 8400 livres, and deducting 1000 livres for the maintenance of a horſe and other neceſſary utenſils, with 1500 for the rent of the tannery of 16 or 17 pits; there will remain about 6500 livres clear profit for 15 months, or a net revenue for each year of 5200 *liv.*

All the valuations I have ſeen made on the produce of tanneries, tend to prove the advantage in hides raiſed by bark; it is in quality beſt; it ſells better, and the coſt is leſs; more ſufficient reaſons cannot be given to adopt its uſe; but the obſtacles are great, namely the ignorance of the tanners; the defect of emulation amongſt them, and that inviſible monſter, *cuſtom.*

Of the price of Engliſh *Hides.*

The fineſt and beſt filled *Engliſh* hides, weigh from 60 to 70 pounds, (avoirdupoiſe) or of 46 to 65 pounds *French*; they coſt in the hair 30 or 40 ſhillings, that is from 34 to 46 *livres*; and when they are tanned, they are ſold at about one ſhilling a pound, which is pretty near 25 ſols the pound, money and weight of *France*; this is very near the price of hides raiſed by bark in the adjacent parts of *Paris*.

Of Hides imported from foreign Parts.

The conſumption of hides in *Europe* is ſo great that they are brought from *Aſia*, *Africa*, and *America*: but the hides from the *Brazils* are in the greateſt eſtimation. In 1710 *Spain* granted to *France* the commerce of *Buenos Ayres*, and then the *Aſſiento* company brought the dried hides from *Buenos Ayres* directly to *France*; for they looked on them as preferable to thoſe of *Barbary*, *India*, and *Peru*. But by the treaty of *Utrecht*, this commerce was ceded to the *Engliſh*, excluding all other nations; then, the *Engliſh* became ſole poſſeſſors of the hides of *Buenos Ayres*. The *French* could not even draw them from *England*, for by an arret of the 6th of *September*, 1701, the drawing of merchandizes from *England* was prohibited, except of the growth of *England*, or compoſed of the growth of *England*, *Scotland*, and *Ireland*; and then our merchants, bought up theſe hides in foreign countries, from whence they imported them into *France*.

In 1724 an arret of council permitted us to bring the dried hides of *Buenos Ayres* from *England*, paying for each a duty of 25 ſols on their entry into the kingdom. The duty was 50 ſols on the hides of *Engliſh* bullocks, but theſe being of a quality very inferior to theſe of *Buenos Ayres*, did not ſeem to deſerve the ſame favour, and remained loaded with a larger duty, that their introduction ſhould not be preferred to thoſe of *Buenos Ayres*;

and to prevent confuſion, it was ordered by the ſame arret, that on the importation of theſe hides from *England* to *France*, the merchants ſhould be obliged, at their arrival, to declare them ſuch, and to get a certificate in due form from the Directors of the South Sea Company, certifying that theſe hides were really ſuch, and come out of the ſales of the South Sea Company.

Since *Portugal* has made a treaty of commerce with *England*, we are again deprived of the *Brazil* hides, and the *Engliſh* being alſo maſters of *Canada*, the commerce of foreign hides is prodigiouſly diminiſhed in *France*.

Of alumed Calve Skins for Book Binders.

CALVE ſkins and ſometimes ſheep ſkins are dreſſed for book binders; in 1765 they ſold at *Paris* for thirty-eight *livres* a dozen: the grain of theſe is very entire, they are worked in lime, and with *confit* or *maſterings*, fleſhed thoroughly and ſleeked with a hot iron. The art of dreſſing theſe ſkins is kept a great ſecret in *France*, being only made at *Verneuil* in *Perche*, twenty-three leagues ſouth of *Paris*, and at *l'Aigle* in *Normandy*. M. *Deſmarets*, *inſpector of manufactures*, being on his viſit to theſe places, ſolicited ſome inſtructions from the *ſubdelegates* on this ſubject, in vain; they ſeemed to lay the greateſt ſecrecy on it; a narrowneſs of mind not to be forgiven in the meaneſt claſs of artiſts.

But M. *Drouin* and M. *Moffatre*, both eminent merchants at *Verneuil*, gave me ſuch inſights as are by no means to be deſpiſed; and which with a little practice will certainly bring the tanner into the method of dreſſing theſe ſkins.

Verneuil contains about 3500 inhabitants, whoſe riches and commerce chiefly depend on *alumed* calves. Meſſrs *Droine* and *Loche* furniſh each year to *Paris* 300 groſſes, or 43200 ſkins. A branch of the river *Iton* is carried through *Verneuil*, which furniſhes all the water neceſſary for this work, and they pretend that the quality of this water is peculiar for the working of *alumed* calve ſkins.

For this kind of leather they chuſe *ſlink calves*, and other ſmall ſkins which do not coſt more than eighteen *livres* a dozen in the adjacent parts of *Paris*. The large ſkins are not uſed, unleſs they be very thin.

The calve ſkins are bought up in a dry ſtate (ſuppoſed the fitter for river-working) being firſt carefully examined, whether they be corroded by inſects, called *weevils*, which make furrows on the grain, and do conſiderable damage to the ſkins: ſuch as are found impaired are firſt worked.

To preſerve the parcels of ſkins from inſects and duſt, it is neceſſary to beat them well with a wand when opened. This operation is needful once a week in ſummer, and leſs often in winter. The place in which they are kept, ſhould be neither hot nor moiſt.

Thirteen dozen of ſkins, called an hundred and a half, with an allowance of four to each hundred, are worked at once, and make what is termed a coop and two tubfulls.

The dry ſkins are ſoftened by being laid in a long oval trench or pit, ten or twelve feet long, by three or four in breadth, and ſix in depth, dug in the ground, and into which the water is made to flow, by an oval ſlip, eighteen inches in height, but ſo narrow as to prevent the ſkins from floating away, the water is contrived to run out again by another cut of the ſame ſhape. In this conſtant courſe of water, properly enough called the *change*, the ſkins lie two or three days in ſummer, and ſix or ſeven in winter.

When taken out, they are heaped, and the following day they are *broken*, that is, they are opened on the beam on the fleſh ſide with a blunt knife, working the head and thick parts more than the reſt, to render the whole equally pliant and ſupple.

This firſt work being done, they are put into water for two days, and then taken out to have the ſame operation repeated. If ſome are found not to be ſufficiently ſoftened, they are put back into the *change* pit for one day; all theſe operations are performed to render them as ſoft as if juſt flayed from the carcaſe, after which they are put into the *lime* pit; this is a hole dug in the ground to the depth of four or five feet, according as required, and broad in proportion: they put in forty or fifty pails of water, to a tun of lime, which is left to *ſlack*; twelve or fifteen hours after it is ſtirred with a wooden rake; freſh water is added, it is ſtirred again, and ſuch ſkins as are ready are put into this new pit, one by one, a workman ſinking them with a perch as another takes them from the pile; they are left in the pit a whole day, and ſometimes more, as neceſſity requires; as they are taken out, they are piled, and well ſtretched out, laying the head of one to the tail of the other. Theſe are limed firſt in a weak pit, the next day in a ſtronger limed pit, and ſo on, *piling* and *pitting* them until the hair peels off eaſily, as I have already deſcribed in the preceding part of this work.

When fit for peeling, they are put into another pit, without ſtirring the lime, to waſh them, and to take off the lime with which they are loaded; they are then brought to the river to be waſhed and to be immediately peeled, obſerving to ſeparate the white hair from the red, as the firſt ſells much dearer. They are put into the *change* pit during the night, having firſt introduced a pole about the thickneſs of a man's leg, lengthways in the pit; at the extremities of this pole are two chains, faſtened by ſtaples, in order to raiſe or lower it; on this are laid the ſkins that have been peeled, and here they ſteep the whole night.

When the ſkins are ſoaked, the *fleſher* takes them out as he wants them, laying them on the beam, with the heads downward. For this purpoſe a very ſharp knife is uſed, that they may be fleſhed to the quick, ſo that the fleſh ſide is ſcarcely to be diſtinguiſhed from the grain; they are pared much cloſer than any others we have ſpoken of; the throat and the head are rendered as thin as the remainder of the ſkin, cutting off the ears, the tails and other extremities. Theſe ſuperfluous parts ſerve to make ſize for ſizing the chains of woollen ſtuffs; they dry this ſize on tiles, ſpreading it very thin, and when it is thoroughly dry it ſcales off; it is ſold from thirty to thirty-five *livres* a quintal. The firſt operation ended, they return the ſkins at night into the water of the *change* pit; and the next morning they fleſh them on the beam with a much blunter iron than that before mentioned, ſo as to take off all the fleſh. After which they are again returned at night into the *change*. On the next morning, three workmen *beam* them a third time, to give them a grain, and to take out the lime. By eight in the morning this work is finiſhed; and whilſt they are at work, a fourth workman lights a fire under a copper kettle, to heat water and to *alum* the ſkins.

To *alum* them, put into a large vat three or four pails of dogs turd; which three or four pails contains about the quantity of two common buckets of the water-carriers at *Paris*. This dogs turd is called *alum*; if they have not ſufficient, they mix hens dung; but this is too *quick*, and muſt be uſed with precaution; on this dogs turd they fling a large pail of water to dilute it; this done, the workman goes into the vat, and with his wooden ſhoes he tramples and tempers it, filling the vat half full of water. The *alumer*, on his part, pours water out of his boiler into this vat, mixing it with the cold water; after which, he flings in the ſkins, ſtirring and turning them for ſome moments with great ſticks; this done, they take out the water of the vat to heat in the boiler, leaving the ſkins one hour in the vat, preſſed into one corner of it, and confined there by means of two ſticks laid acroſs; the water is taken out of the boiler pail by pail, and poured into the empty part of the vat, ſtirring it well to mix with the cold, and to prevent its ſcalding the ſkins. When the water has acquired a proper degree of heat in the vat, the croſs ſticks are taken away, and the ſkins are ſtirred and turned with ſtrength, three ſeveral times.

The liquor is taken a ſecond time out of the vat and heated in the boiler, and after half an hour's reſt, the *alumer* draws them towards him confining them in the corner of the vat with the ſticks; he examines thoſe that are thinneſt, and what progreſs they have made, adding warm liquor in proportion as he ſees them advanced: this water muſt be no warmer than to bear the arm in it, plunged to the bottom of the vat. The croſs ſtick being taken from the corner, they are ſtirred briſkly; the boiler muſt always be kept full, and the arm plunged from time to time in the vat, to know whether the water cools; in ſummer more precautions are to be taken than in winter.

A quarter of an hour after, the workman gathers the ſkins to his ſide, puts the croſs ſtick to the quarter as before, and attentively examines the ſtate they are in, opening them length and breadthways, and when he finds that they yield and lengthen well, and appear as if ready to melt, it is time to take them out; one or two dozen are firſt lifted out, which are put into pails, after which he empties the water as above, and turns them three or four times, and fills the boiler; a quarter of an hour after, he draws them towards him again, puts up the croſs, and takes a greater number out of the vat. Here lies the whole judgment of the operation, for if any thinner than the reſt are left in this liquor too long, they would be melted, as ſome ſkins are more difficult to work than others, it happens, that ſome are fit to take out, while others are far from being ſo; it ſometimes requires ſix or ſeven hours before the ſtrongeſt are *alumed*, which cauſes the ſame operations to be repeated, by conſtantly augmenting the heat to the end of the work. As they are done, they are put on the *beam*, and are preſſed with the iron on the fleſh ſide to lengthen and cleanſe them; if ſeven or eight ſhould be found ſtiffer or firmer than the reſt, they muſt be left in the vat whilſt the other are draining.

When they are all taken out of the vat, the water is emptied by the diſcharging hole, and being well waſhed, it is half filled with river water; the ſame ſkins are rinſed in it one after the other, and turned about three ſeveral times with ſticks, after which a baſket of tan is added, and they are ſtirred again; this done, the *alumer* draws them towards him, repaſſes them under his hand, and puffs them to take out the ſtains of the tan, turns them three times in the vat, and leaves them.

The next day, a woman takes out the ſkins, and puts them on planks to drain; after which ſhe brings them to her work-ſhop, where ſhe examines them one after another and ſews with a common needle thoſe ſmall holes made in the ſkin, by the knives of the butcher, or fleſher. ſhe then ſews up the body of each ſkin in the form of a budget or bag, except the tail part, leaving the fleſh ſide outward; ſhe uſes for this purpoſe a ſmall ſquare needle made for this uſe, and flat at the point, with double thread; taking one ſide of the ſkin, at one ſixth of an inch (to two *lines*) diſtant from the edge, and the other at half an inch (or ſix *lines*); ſhe turns them down like a hem, but without tightening it, ſo that the water may go out gently; for in tightening the ſeam too much, a kind of black horn would be formed all round it; the *vat-man* turns them out, and puts into each ſkin a quantity of tan proportioned to its bigneſs. This done, the woman ſews the tail part, leaving a ſpace for the entrance of the copper neck of a wooden funnel. After this the *vat-man* conveys the ſkins filled with tan near his vat, and flings thoſe ſkins which have been in the vat, on a rack, to unſtick them. The vat muſt be half filled with *auvergne*, which is nothing more than water taken out of another vat in which the ſkins have been emptied of their tan, that is, in which the tan has been put, with which they had been filled; to draw the water clear out of this vat, (which is oval, as are the two others) they make a door at the end to form a valve, whilſt the vat is full of tan, and the tan water filters through the door, which is heated in a boiler before it is emptied in the vat where they are to be vatted.

When the water that has been emptied out of the tan vat into the boiler is ſufficiently warm, (that is lukewarm) it is poured into the vat in which the ſkins are to be vatted, mixed with cold water that was in the vat.

The vatman takes one of his ſkins, and by the means of his funnel, he pours in a ſmall pail of water, ties it with a ſmall ſlip of ſkin left for that purpoſe on the tails, and when he has filled them all with the like quantity of water, be lets them reſt for one hour. In the mean time, he heats other water, which he draws from the ſame vat he took the firſt, placing a rack at one end of the vat to hang on the ſkins, from whence he takes them. and fills them as full as he poſſible can by means of his funnel and little pail, tying them faſt that the water may gently filtrate itſelf through the ſeams; this operation cauſes the ſkins to ſwell like foot balls, and they form a pyramid in the vat. This operation is repeated a third time, letting them reſt one hour each time, and giving always a new degree of heat. Attention muſt be given to the degree of liming the ſkins have received, that is, to give leſs heat to thoſe which have been much limed, and more to thoſe which have had leſs of the pit; this requires much experience in the vatman.

The enſuing day the ſame operation is performed in a third vat, whilſt the ſkins of the preceding evening are left in their vat, to feed on the tan with which they are filled. Two days after, all the ſkins are taken out of the firſt vat and drained on the rack which is ſupported by two ſmall joiſts, ſupported on the edges of the vat. When they are drained, they are flung on the rack of the vat, where they are to be unſtitched and emptied of their tan, and as faſt as they are unſewed, the fleſh ſide is doubled inward; they are brought to the river ſide, when they are waſhed on the grain; another workman puts them croſs-ways on a *treſtle*, where they are left to drain, after which they are brought into a drying loft, where they are opened by the two hind pattes and hung the head downwards, on nails ſix inches diſtant one from the other.

When they are very dry, they are piled, and thus left till the time they are ſent to *Paris*. When they arrive at this market, if in ſummer, they are expoſed to the dew, and early in the morning the workmen trample on them with wooden ſhoes, to beat down the ſeams; they are ſtretched in all directions and rendered as ſupple as gloves.

This operation from the ſkin in the hair requires ſix weeks in ſummer, and in winter eight at leaſt.

It may have appeared extraordinary to ſee the word *alum* uſed in *France* for *maſtering* or dogs dung; without doubt they formerly paſſed theſe ſkins in *alum*, and they have preſerved the name of a work forgot.

I have ſaid, that in default of dogs dung, they ſometimes uſed that of hens, which almoſt produces the ſame effect in a ſtronger degree; this ſubſtance takes down the ſkins, and corrodes them ſo much that they might be taken for thin linen, and the light is ſeen through them; ſo that, if a workman be the leaſt negligent, the water too warm, or the ſkins too much ſoaked, the thin parts will tear, either in the vat, or at the book-binders.

Thunder and fogs are prejudicial to theſe kind of ſkins, and they endeavour to work them, as much as poſſible, in ſpring and autumn.

Hog ſkins are worked after the ſame manner to cover large church bibles; theſe are the moſt durable.

Baſils or tanned ſheep leather for book-binders, are not *alumed* like calves, they only require *liming* and the *vat*: the working is pretty much the ſame as that of calves. There are baſils worked after the *Daniſh* manner, and baſils laid in the tan pit; the firſt are ſowed round like the calves; the others are not ſowed as in the vatting here mentioned.

The tanners of *Verneuil* and *de l'Aigle* are perſuaded that the quality of their *alumed* calves, proceed from the quality of the water which is ſoft, and they would perſuade us this leather can be made in no other place. It is true they have made experiments at *Paris* that have not ſucceeded, yet I am certain that by a little more experience we ſhall excel them. M. *Barois*, director of the manufacture of *St. Hippolyte*; propoſed to undertake it, when the tanners of *Verneuil* combined to augment the price of their ſkins. The market price is from twenty *ſols* to twenty-two *ſols* a pound.

The reaſons given for this augmentation of price are, 1ſt. foreigners buy up our beſt ſkins, which cauſes the remainder to be extremely dear: 2d, the *Britons* kill their calves at eight or ten days old; if they kept them only to the age of one month, it would be a great relief, for at this very time when they want to ſell them by weight, thoſe ſlink ſkins which weigh but one pound and a half would weigh two pounds or two pounds and a half; 3d. the tanners give two or three years credit to the book-binders of *Paris*, with whom they run great riſks: ſo that rich merchants only can carry on this commerce.

Meſſrs. *Drouin* and *Loche* of *Verneuil*, ſend each year to *Paris* about three hundred groſs of *alumed calves*, (that is forty-three thouſand two hundred) and ſend them up every three months; thoſe of *de l'Aigle* make much leſs, and have no fixed time for their ſale.

When the book-binder makes uſe of theſe *alumed calves* he ſoaks them in water, twiſts them, ſhaves them on a ſtave or convex board in the ſhape of a beam, with a knife like a dagger, made of the blade of a broad ſword, with two handles; it does not cut, but only extends the ſkin, thins it, cleans it, and takes off the tan that might ſtick to it.

The ſkin being cut up in ſmall pieces, they are extended upon ſmooth poliſhed ſtone to be pared on the fleſh ſide, on the edges and other thick parts: the paring knife is much like a carpenter's chiſſel; it is very ſharp and very thin: it is now prepared to be paſted on the boards of the book, ſo that the book-binder performs ſome part of the currier's buſineſs.

OF THE

Art of Currying Leather.

WHEN the tanner has given the neceſſary conſiſtence and firmneſs to the leather, ſeveral operations are ſtill neceſſary to prepare it for the different purpoſes it is to be applied to, and this is the buſineſs of the *Currier*. In country places, all tanners are curriers: at *Paris* they form two ſeparate corporations; yet there is ſuch a connection betwixt theſe two trades, that a treatiſe on tanning would be imperfect without the art of currying.

There are ſome kinds of leather that take their name and uſe from the work of the currier, ſuch as *Ruſſia* leather, ſo that its proceſs conſequently falls under this chapter.

The appellation of *Currier* is derived from the *Latin* word *Coriarius*, a worker in leather; and altho' this etymology be general, the ſignification of the word is determined by uſe, and is applied to thoſe only who work the leather already tanned, either in oil, in tallow, or in colour, who give it a luſtre, ſuppleneſs, and a fine grain. Some think the word *Currier* is derived from *corrugare*, to wrinkle, becauſe the currier gives wrinkles and grain to his leather.

The currier receives his leathers from the tanner, and he ſells them to the ſhoe-makers, ſadlers, coach makers, harneſs-makers, trunk-makers, caſe-makers, and book-binders; all have occaſion for the currier, they require leather more or leſs ſtrong, and variouſly dreſſed; theſe different dreſſings conſtitute the art I am about to deſcribe.

Curriers finiſh bullocks, cows, calves, ſheep, and goat ſkins; ſometimes they give to thoſe laſt the name of *maroquins*, not *Morocco* leather, for that is an operation will require a particular treatiſe. As to the hides of horſes and mules, they are chiefly uſed by the *Hungarian* tanners, who ſerve them with alum and tallow to make what is called the *German leather*, which alſo ſhall be deſcribed in a ſeparate treatiſe on *Hungarian* leather, as curriers ſeldom dreſs horſe hides.

I have been informed that in ſome parts they curry ſtrong hides with the paumelle and iron ſleeker whilſt they are ſtill wet; this ſtrengthens them, and makes them more beautiful, but the work is extremely laborious: I think the ſame effect may be produced, by well beating the ſtrong hides, as mentioned in the art of tanning. Some curriers put their ſtrong hides in tallow; to prevent their ſoaking the wet, but in general the ſtrong hides do not come under their hand, the trade being confined to cows, calves, ſheep, and goat ſkins.

Curriers call all *thin* hides cows, whether of cows or ſmall bullocks; yet they diſtinguiſh them into male and female cows: the female are more eſteemed than the male, being more firm and compact than thoſe of young bullocks. In general, of thin hides that are worked, thoſe of cows ſucceed better than bullocks, whereas among ſtrong hides the bullocks are the firſt; the name of hide in *France* ſeems conſecrated to oxen; thus alſo they diſtinguiſh the *hide* tanned and curried from the *cow hide* tanned and curried (though the work be abſolutely the ſame), according as an ox or cow hide has been uſed.

Theſe dreſſings of oxen or cow ſkins are diſtinguiſhed by curriers into *harneſs* and *ſaddle leather*; *ſhoe-makers* and *coach-makers leather*; *waxed leather in tallow*; *black ſleek leather*; *waxed leather*; *Engliſh* and *Ruſſia leather*. I ſhall firſt deſcribe the general operation of the currier, and then enter into a detail of the different kinds of leather manufactured at *Paris*.

They begin by paring or rounding the cow hides, that is, they cut off the tails, the foreheads, and the dugs; theſe parts, being hard and horny, would only ſpoil the knife, and blunt its edge, without being beneficial to the uſe the ſkin is intended for; beſides they would abſorb the tallow without profit. They alſo cut off ſmall pieces towards the hind parts where they expect any wrinkes; theſe parings and ſmall pieces are not uſeleſs; the ſhoe-makers uſe them for heel-pieces, for lining and for raiſing their laſts.

Of the Method of ſoftening Hides.

The firſt work common to the different preparations of the currier is to ſoften his hides with water, and to trample them with the heel or with the *pin-block*, the harneſs-leather excepted, which is not to be trodden.

The currier receiving a hard dry ſkin from the tanner, begins to briſken it, by ſprinkling the ſkin with a broom dipped in clear water. In this work firm and porous ſkins ſhould be diſtinguiſhed; the laſt requires leſs wetting than the firſt; the drieſt parts are wetted moſt. The ſkin being ſufficiently wet, it is trodden under foot, till ſuch time as 'tis thought the water has equally penetrated every part, and the ſkin is ſupple enough to be worked; for greater neatneſs they ſhould be trodden on a hurdle.

The hurdle is compoſed of a frame of ſix pieces of wood, of about three inches ſquare: the two ſides are five feet long; the croſs ones three, tenanted into the ſide pieces at equal diſtances. The four croſs-pieces are interwoven with large twigs ſo as to form a hurdle.

The ſkin being flung on the hurdle, is beaten and bent in all directions under the feet, treading it with the heel, for a quarter of an hour, or longer, until it be ſufficiently ſoftened: the left foot holds it, whilſt the right heel drives it back with ſtrength. This is commonly the work of apprentices, as it requires no art: for this purpoſe they are provided with thick ſhoes, made of three ſoals of the beſt leather, and ſtrengthened on the upper leather.

The *pin-block* is uſed to eaſe the feet; it is a block of wood of five inches ſquare, and four inches and a half thick, containing four wooden pins or ſmall feet, each one inch and a half in length, with which the leather is beaten, and a handle of two feet and a half; ſo that it reſembles a carpenter's mallet with four pegs in one face of it. Cow hides are always beaten with this inſtrument, when put in black, eſpecially when the ſkins are very hard; but the treading muſt not yet be omitted, that the ſkin may be ſoft and pliable.

When ſufficiently ſoftened, they are worked on the *wooden horſe*, *leg*, or *beam*, after different manners, according to the uſes they are intended, and with different kinds of knives. The *French* curriers uſe three ſorts of knives, called three-quarter knives, half knives, and quarter knives.

The three-quarter knife has two handles, is ſtrait, and the blade three fingers in breadth; this does not cut, it ſerves only to cleanſe thoſe parts of a ſkin which the next knife might weaken too much; it only takes off the ſtringy particles and thoſe loaded with bark, which hold but lightly to the ſkin. This inſtrument is commonly made out of an old knife.

The half knife ſerves to fleſh the ſkins neatly, without taking off much of the fleſh; this is a cutting knife, and is generally made of the blade of an old broad ſword, in ſhape like the firſt.

The quarter knife is broader, its blade being fifteen or ſixteen inches long and five or ſix inches broad: its edge is extremely taken down or cambered; it is laid upon the ſkin with its blade perpendicular to the ſkin, the edge downwards, in ſuch a manner that the edge alone takes off the light layers of the ſkin, until they be every way equal to the neck; they ſometimes take off two or three layers, when they want to bring down the ſkin, that is, to make it very thin, for the ſadlers uſe.

This quarter knife has one of its handles placed like a croſs, or perpendicular to the blade, that it may the more eaſily be conducted ſtrait over the ſkin; this is done by a butcher's ſteel, which lets down the edges of this knife, the one above, the other below; that thus it may ſerve to cut on both ſides. This knife coſts from 15 to 18 livres, as it is of importance to the curriers to have it good.

It is with this laſt knife that the currier performs his ſecond operation, which conſiſts in taking off the fleſh ſide throughout the ſurface of the ſkin; this is done to thoſe *cows* that are intended to be put in tallow or oil, to ſmooth and make them thinner; it often happens ſome parts of ſkins are thinner than others, from theſe parts no fleſh is to be pared off, but only to be cleaned by ſtrength.

The *leg* or *beam* is four feet in length, the board is ſeven inches broad, convex, and ſometimes ſo thin as to be ſpringy; but it is better it ſhould be firm.

Sometimes the *beam* is loaded with a ſtone, to give it more ſolidity.

The cuttings and fleſhings that fall at the foot of the *beam*, ſerve to wipe the black of the leather, after which they are burnt.

Thoſe ſkins which require perching, are pared on the edges with the perching knife, which we ſhall deſcribe hereafter; theſe are all the operations performed by the *beam* and *knives*.

For calves and ſheep ſkins, intended to be put in tallow or in red, they uſe the pumice-ſtone, after they have been paſſed over with the knives; this takes off the fine fleſh, without prejudice to the ſkin.

Of working with the Paumelle, or graining board.

This is a general operation on all ſkins to be curried, without exception.

The *graining board* is a ſquare tool, made of hard wood, ſuch as the cornil tree, or the wild apple or pear; it is about a foot long, and five inches broad. The largeſt are two inches thick in the middle, and one inch at the extremities; the fineſt are but one inch thick in the middle, and in proportion at the extremities. The upper part flat and even; but the under part is convex or arched, ſo that the middle is thicker than the two ends; this is furrowed acroſs its breadth, that is, covered with ſtrait and parallel chamferings, or hollow furrows, whoſe intermediate edges are ſharp like the worm of a hand coffee mill.

In the large boards theſe furrows are one ſixth of an inch in depth, and one ſourth in breadth: on the upper ſurface a ſlip of leather is nailed croſſing its breadth; to receive the hand like that of a horſe-bruſh, the workman extends the flat of his hand on the board, to paſs it ſtrongly on the ſkin, to temper, gather, turn up, and form the grain; for it is principally this board that gives that agreeable grain, ſo much eſteemed in leather.

They have *graining boards* of different ſizes, whoſe furrows are more or leſs deep, according to the quality of the ſkins; there are alſo *graining boards* made of cork to ſoften the ſkin; to raiſe the grain and to lay the fleſh, becauſe thoſe of wood mark too ſtrong with their teeth. The largeſt, which are uſed for harneſs and ſleek leather, the hardeſt operations belonging to the currier, have only about forty teeth in the length of a foot; the fineſt, for finiſhing goat ſkins, have about one hundred. The middling are uſed for grained *cows.*

To work with this graining board, the ſkin is doubled grain to grain, and extended on a table; the implement is advanced on the fleſh, and drawn back ſtrongly, by bringing back the quarter which rubs unequally on the middle of the ſkin; it is this unequal rubbing which gives it the ſuppleneſs and grain, repeating the ſame ſucceſſively on the three other corners of the ſkin; this is called *tempering* the four corners.

When the *board* is paſſed on the grain, which is called *turning up*, the grain is laid down, and the ſkin becomes ſleek, ſoft, and equal; for the grain being wrinkled by the folds made in the leather, the board preſſes theſe wrinkles; they ingrain in the teeth of the board, and by that means become more formed and more durable. They perform this operation from tail to head and acroſs theſe *cows*, which are to be put in black; the calves are turned up from tail to head, and are frized acroſs only. To ſhorten the work, they wet (before putting in black) the black cows and goat ſkins, and they are tempered at the four quarters when they are in black.

We muſt obſerve, that *cows* in tallow muſt be boarded or grained acroſs with the inſtrument; for this purpoſe the ſkin is extended on a table, having the tail part and moſt of the ſkin hanging before the workman, who doubles this hanging part upon that which is on the table, and preſſing ſtrongly on this fold, he brings it towards him with the paumelle, thus to form the grain, and this is called *frizing* acroſs. They do not paſs over the quarters, till they have *frized* acroſs; by this method the grain croſſes and rounds itſelf, inſtead of being formed in ſtrait lines, which would otherways happen if it was always worked in one direction.

Of Sleeking Skins.

The work of the *ſleeker* is alſo common to all parts of curriery: the ſleeker is a flat plate of iron or copper, of one fourth, or of one third of an inch thick at the top, that is, in that part which ſerves in lieu of a handle, and terminating by a kind of blunt edge; this inſtrument is of different ſizes, from five or ſix inches to a foot; the cutting part forms an arch of a circle, the handle is a great deal narrower; and the whole reſembles the head of a carpenter's axe, but not ſo broad at top or ſo ſharp on the edge. Thoſe made of copper are uſed for ſtretched cow-leather, for red cows, ſkins made after the *Engliſh* manner, and generally for all ſkins where there is danger of blackening the grain, becauſe iron, unleſs great caution be uſed, blackens the ſkins.

The workman that *extends*, holds his tool almoſt perpendicular on the leather, and with both his hands rakes with force thoſe parts which are too thick; thoſe in which tan or fleſh remain, thoſe in which there are hollows and cavities; working the thickeſt parts towards the thinneſt; in ſhort, he makes the ſkin more denſe, more compact, and more equal. That the inſtrument ſhould not hurt the hand, it is ſometimes ſurrounded with a ſlip of leather for the hand to reſt on.

The *ſleeker* ſerves to extend the ſkin, and beat down the grain; it forms the principal part of the work of cow-leather extended; of which I ſhall ſpeak more particularly. Calve ſkins in oil, and goat ſkins, are not worked with the *ſleeker*, as they require only to be fleſhed.

Manner of Perching with the Perching-knife.

Perching, is a particular work belonging to curriery, which I ſhall here deſcribe. The *perching*-

ing knife is a circular knife, cutting in its whole circumference; it is 10 or 12 inches in diameter, with a round opening of four or five inches diameter in the centre to paſs the hand. The *perching-knife* is concave, like a bowl or leather cap; the back or convex part is applied on the ſkin; its edge is not very ſharp, but muſt be a little beat down towards the workman, or the ſide oppoſite to the ſkin; the edge is taken down by means of a butcher's ſteel, that it may not penetrate too deep into the ſkin; this knife coſts ſix or eight *livres*.

Previous to the perchings of a ſkin, it muſt be pared round the edges; this helps the perching-knife, and renders the operation much eaſier to the *percher*. To pare the edges, the ſkin is extended on the *beam*, and a layer of two inches broad is taken off round the edges of the ſkin.

All ſkins in oil, which come under the perching-knife, muſt firſt be pared on the edges; however this might be done with the perching-knife, but the work would be more tedious; for all the edges of the ſkin muſt be perched on the hand.

To *perch* a ſkin, it muſt be extended on a ſtick ſupported horizontally at five feet from the ground, and this is called the *perching-ſtick*; along this perching-ſtick a thick rope is extended, on which the ſkin is ſuſpended lengthways with the grain on the inſide; and paſſing the ſkin under the perching-ſtick, they bring it back over the cord, ſo that it ſurrounds the perching-ſtick: thus the ſkin preſſes the cord againſt the ſtick, and the edge of the ſkin being ſeized between the one and the other, the hold becomes the ſtronger, the more they lean on the ſkin with the perching-knife.

The ſkin thus extended on the ſtick, the *Percher* ſeizes the lower part with a pair of *pincers* and a running loop, ſomething like a ſmith's tongs; this pincer hangs by a cord from his waiſt, taking his perching knife with both hands, he leans the convex part on the ſkin, and bringing it back from top to bottom, he takes off the fleſhy and groſs parts of the ſkin, this is called *perching*; they generally perch from tail to head, ſometimes acroſs: this is the moſt difficult operation of a currier.

It requires about one hour for a cow ſkin, but they can perch ſix or eight dozen of goat ſkins in a day; all ſkins prepared in oil are perched, whether cows, calves, goats, or ſheep ſkins.

The *perching* knife muſt be paſſed from time to time on an oil-ſtone, and its edge taken down with the blade of a knife; that it may not enter the ſkin too quick and too ſudden.

After having laid down the general operations of the currier, I ſhall paſs to the detail of the different kinds of preparations, beginning by the moſt ſimple: I muſt firſt obſerve, that ſometimes cow ſkins are worked whole, at other times they are cut into two; ſometimes they cut the point and the belly to make the ſkins ſquare, of theſe offals and the tail pieces they make harneſs, &c. the other cuttings which are thinner, ſuch as the point (or head) and the bellies, are ſold to ſhoe-makers for inward ſoal.

Of Leathers that are drawn out.

Leather drawn out is the leather of ſmall calf or of cow hide tanned, worked with the graining board and hardened with the *ſleeker*, to make thin ſoals; calve ſkins thus ſleeked ſerve to make belts.

Extending or ſtretching of leather is the moſt ſimple part of the curriers buſineſs, its deſign being to make it firm and ſleek, ſo that it ſtands in no need of oil or tallow.

When leather has been tanned after the *Daniſh* manner, the currier wets it, fleſhes it on the *beam*, wets it again, paſſes the iron ſleeker on it; dries it a ſecond time, paſſes it over again with the ſleeker, and when it is quite dry, poliſhes it over with a glaſs ball; this makes what is called *belt leather*. I ſhall here lay down the working of this leather as practiſed at *Paris*.

To *ſleek* or extend a cow hide as it comes from the tannery, they take off the head which is too thick; they cut the hide into two, to work each half ſeparately, they plunge it into a tub to wet it a little, and take it out immediately to work it whilſt moiſt.

They firſt turn it up with the graining board to ſmooth it, to take out the chinks, to open and prepare it for the ſleeker. In order to paſs the *paumelle* or graining board on the grain, they extend it on a ſtrong oaken table, on which it is faſtened by an iron inſtrument, the *paumelle* is worked on the grain from tail to head and croſs-ways, for about three quarters of an hour.

It is fleſhed on the *beam*, after which it is worked with the *paumelle* on the grain a ſecond time, from tail to head, and croſs-ways, with greater ſtrength than at firſt, becauſe the fleſh being taken off, the ſkin yields better to the *paumelle*; they wet it on the fleſh ſide with a rag ſoaked in water, that it may the better ſtick on the table, and that the fleſh may be well laid; they *extend* it on the table, and work it with the *ſleeker* on the *grain* ſide, preſſing as hard as poſſible with both hands, which ſmooths the ſkin and makes it equal, by driving the thicker parts towards the thinneſt. This operation laſts half an hour, beginning towards the middle, and driving the *ſleeker* towards the tail, then towards the head, ſometimes obliquely and acroſs. Care muſt be taken not to wet it too much, nor to expoſe it to the wind, it hollows the ſkin, and makes it ſoft.

It is *extended* in the air, and when there is ſcarcely any water remaining it is *retained*, that is, the grain is paſſed over again with the *ſleeker*, being firſt wetted a little on the grain ſide with a ſwab ſoaked in water, giving more water to the parts which are moſt dry; that is, as the ſkin has more ſolidity in the heart, and the edges are the firſt dry, theſe parts muſt be wetted when the ſleeker is paſſed over; when ſleeked, a wetted rag is paſſed over the grain, which muſt be well wiped, for the beauty of the work is neatneſs. They are then dried in the air for ſeven or eight hours in ſummer, and put into preſs for three hours, and out again in the air; and when they are almoſt dry, if they ſtill are warped or crooked, they muſt again be put into preſs, and they are finiſhed.

This leather is uſed for the ſoals of pumps, for inward ſols, for the quarters of ſaddles, and other different works of ſadlers and harneſs-makers; this kind of leather is not blackened, but preſerves its natural fallow colour of tanned leather.

One man cannot finiſh more than four of theſe ſkins in a day, and if of ſtrong leather but two, or if made of ſtrong ox hide perhaps not more than one.

Of Sleek Leather.

A ſtrong cow, or ox hide, paſſed in tallow and blackened, whoſe grain has been beaten down with the ſleeker (and which is ſtronger than the black cow leather, or cow in tallow, of which I ſhall ſpeak hereafter) is called ſleeked leather; it preſerves its ſtrength like the former cow leather, but it is ſofter and leſs ſtubborn on account of the tallow with which it is penetrated.

Sleeked leather is generally made of the ſtrongeſt ſkins fit for harneſs-makers uſe, which requires great ſtrength, whereas the grain leather or cow in tallow, of which I ſhall ſpeak hereafter, is uſed to make ſtraps, belts, and ſuch like; the grain has a pleaſing aſpect, and is always uſed in works that do not require ſtrength, ſo that the curriers make more cows in grain than ſleeked leather.

The *grained* and *ſleeked* cow leather are both put into tallow and into black; the difference of working between a cow put into tallow, which is to receive the *grain* and that which is to be *ſleeked*, conſiſts in giving ſtrength to the latter, whilſt *grained* leather requires ſuppleneſs only.

To make this a tanned and dried hide, is to cut it into two, and the head taken off, it is wetted or damped in a tub, and trodden; care muſt be taken not to wet it too much.

It muſt be well treaded, ſo that there remains no hollows, for nothing is more unpleaſing than ſleeked leather that has hollows when finiſhed; the paumelle or graining board is then paſſed on the *grain* ſide, and it is fleſhed lightly with the cutting knife. It is hung out in the air, trod again half wet, expoſed again to the air, trod again; the paumelle paſſed on the grain ſide, put out again into the air, and left there till it is dry at heart to receive the tallow.

To tallow a hide, take common beef or mutton tallow, either is indifferent as to the goodneſs of the leather. Sheeps tallow affords a better luſtre to the ſkin, but being dearer it is ſeldom uſed; at *Paris* they buy brown tallow, extracted from the greaves, after the white tallow has been drawn off for candles. This brown tallow coſts about ſix or eight ſols a pound; they have alſo tallow brought from *Muſcovy*. It generally requires five or ſix pounds of tallow to a ſleeked hide, more or leſs, according to its ſtrength; the ſleeked leather being ſtronger than the cows in black, conſequently require more tallow.

Before a ſkin is put into tallow it muſt be ſinged, that is, paſſed lightly over a clear ſtraw fire, to make the tallow penetrate the better; but *ſleeked*

ſleeked cow ſkins are not to be ſinged on the *grain*, becauſe the fire would cloſe the grain too much, and render them more difficult to be taken down, therefore theſe are ſinged only on the fleſh ſide. The ſkin is then taken near the boiler, where the tallow is melted, and extended on a table. The tallow muſt be heated to that pitch, that a drop of water dropped into the boiler may evaporate; without this the tallow would congeal on the ſkin, and would not penetrate, yet it muſt not be ſo hot as to burn the ſkin.

To lay on the tallow, they uſe a woollen ſwab fifteen or eighteen inches in length; it is bound together, ſo as to make a handle of the length of ten inches or a foot, ſix inches remaining forms the tuft or mop of the ſwab. The tallow is laid on the *grain* and *fleſh*, but more on the fleſh ſide, on which the tallow is firſt ſmeared, becauſe that is the moſt open and porous: care muſt be taken that the edges and groin be well fed, theſe being the moſt ſtubborn parts; a ſkin loſes a great deal of its beauty when the extremities are badly fed; it requires about five minutes to tallow one *band*, that is, half of a cow hide of a middling ſize.

After the tallow is laid on the ſkin, it is folded ſquare, the grain ſide inward; it is left to ſoak in a veſſel for a night, or for eight or ten hours. The next day the water is preſſed out, by the foot and pin-block, till ſuch time that all water is expreſſed. Only one band, or half a hide, is to be trod at once, for if two were trod together, one would have time to ſtiffen and dry.

The fleſh ſide is grained or frized with a *paumelle* which has pretty large teeth; this *frizing* only ſerves to cleanſe and ſcour the grain; the *paumelle* is then paſſed on the grain from tail to head, and croſs ways until the grain be almoſt beat down; care muſt be taken to paſs the *paumelle* well on the borders that the ſkin may lay the cloſer on the table.

The ſkin is then extended, the fleſh ſide on the table, by ſtrength of arms, it muſt be well beat down, and ſmoothed with the *ſleeker*, and this is what is called ſleeked leather. The grain is wiped with the fleſhings, to take off the fat, and it is blackened immediately, without taking it off the table.

To compoſe the black, fill a tun with old pieces of ruſty iron, pour on it ſour beer ſufficient to cover the iron, let this beer work on the iron for three months, and draw off the liquor, which appears a little reddiſh, but will perfectly blacken the ſkin. Dip a woollen rag, or bruſh made of horſe-hair, into this liquor, with which ſmear or rub the ſkin on the grain ſide, and it will immediately turn to a fine black.

At *Paris* they uſe the *Hatters black* compoſed of gum, logwood, copperas, and gauls; it hardens the ſkin more than the black of beer, but it coſts leſs; they add one pound of copperas to each pail of black: I ſhall hereafter ſhew different methods of compoſing the curriers *black*, with ſour wine, with the water of the vat, and with ſour leaven ſteeped in damaged beer.

The firſt black is given on the table after the leather has been drawn out with the ſleeker; but black cow leather muſt be hung in the air to dry, before it is blackened.

Having given the firſt black, it is hung out in the air, there left till it is three parts dry, then paſſed over with the *ſleeker* on the grain ſide, gently, for fear of fraying the grain; the ſleeker muſt always be puſhed forwards, and not inclined on one ſide more than on the other, for that will give ſhades to the leather, inſtead of its having a regular and uniform look.

The edge is formed, by cutting the back of the band with a knife, and rubbing it with its edge to make it appear thicker, and then it is blackened; they gave a ſecond black to the *ſleeked* leather, after the ſame manner as the former, expoſing it again to the air; and when it is almoſt dry, (retaining yet ſome little moiſture in the middle) it is a ſecond time paſſed over with the ſleeker, after the ſame manner as before; it muſt be well laid down, that is, very ſmooth, without any mark, or ſtroke of the ſleeker.

When it is dry, they ſometimes give it a third black, if any red places appear, which have not rightly taken the black; but this is ſeldom neceſſary.

The *ſleek* leather being dry, is put at ſeveral times into a preſs to be dreſſed; it may be left a week or a fortnight in preſs, when it is nearly dry; before it is thoroughly dry, it puſhes out its tallow, but this only ſerves to harden it.

To finiſh the *ſleek* leather, wipe off the tallow and mould that may have gathered on the grain, luſtre it with ſour beer, and paſs the ſleeker over it, repairing and amending ſuch ſpots as the ſleeker may have miſſed in the former operations. When this is done, hang it in the air to dry out the beer; one hour is ſufficient for this, but the ſun is to be avoided.

The leather is brightened with the juice of wild barberries, which grow in the hedges in *France* in cluſters, and are ripe in autumn; the juice is expreſſed like that of the grape, and is kept in veſſels to brighten the leather. I ſhall in the ſequel ſhew other luſtres.

If it ſhould be found that in any part of the leather the grain ſhould be worn off, or ſpotted with fat, it muſt be again luſtred, by rubbing lightly the defective parts with a piece of woollen ſtuff wetted in the luſtre, until they become as bright as the reſt of the leather.

A ſleek hide of a middling ſize is worth 15 *livres* the ſide, that is, 30 *livres* the entire hide.

Of Cow leather in Tallow, with the Grain.

Cow leathers in black, or *cow leathers in tallow, with the grain*, are thoſe on which the grain is raiſed, inſtead of beating it down as in the *ſleek* leather, which has been already deſcribed: they are more ſupple and ſoft than *ſleek* leather, yet they have more ſubſtance than cow hides in oil, they are alſo leſs liable to be ſpungy, that is, to be penetrated by water, than the oiled cow leather.

Cow hides in *tallow* and *grained* are chiefly for the ſaddlers, harneſs makers, and trunk-makers uſe; they are chiefly appropriated to harneſſes and coaches, and ſerve for the moſt neat and ornamental parts. For the tops of coaches they chuſe the largeſt and ſoundeſt, and they work them whole, without cutting them in two; a fine pavillion or imperial of a coach, when well grained and without defect, is the maſter-piece of a currier.

To put a cow-hide in tallow, take the hide whole as coming from the tanner, tread it, to open and ſoften the ſkin; it muſt be trod till no cavities remain; then fleſhed, rendered equal and uniform with the cutting-knife, and care muſt be taken that the knife does not ſtreak it, that is, that the edge may be ſoft and ſmooth. It is hung out in the air, when half dry, and trod again; this ſecond treading half wet is called *retaining:* this operation opens the ſkin and prepares it to receive the tallow; it is then again trod until there remains no cavity or impreſſion of tan.

The ſkin is again hung in the air; and when almoſt dry, it is trod a third time, after which they roll it to take off the folds; if it is too hard, it is ſprinkled with a broom, that it may the eaſier be trod. It is paſſed on the grain with a *paumelle* made of cork from tail to head, which ſmooths it, and cauſes the tallow to extend more equally.

When it is well trod, it is hung in the air, but taken in before dry at heart to be tallowed. This moiſture prevents the tallow from ſeizing and hardening the ſkin; it would be even good to ſprinkle the ſkin on the fleſh and grain ſide before it receives the tallow, otherwiſe the hot tallow might burn it.

To make *black cow ſkins*, the tallow is applied after the ſame manner as for *ſleek* leather, except here both grain and fleſh muſt be ſinged, whereas *ſleek* leather muſt not be ſinged on the grain.

The quantity of tallow required is in proportion to the ſtrength of the ſkin, from three to four pounds for a common cow, more or leſs, according to its weight. A calf-ſkin, weighing two pounds when dry, takes about half a pound of tallow; one of three pounds takes one pound of tallow.

After the tallow has been applied once on the ſkin, it is rolled, and folded the grain inwards, that the tallow may penetrate in every part; it is thus left ſome hours; it would be the better to remain ſo ſome days, as the tallow would have greater effect. It is folded ſquare, put to ſoak eight or ten hours in a large veſſel filled with water, as mentioned for *ſleek* leather.

It is trod whilſt wet, and ſoaked two or three times in the water, until the grain appears white, without any of the filth of the tallow; yet it muſt not be too much ſoaked, for that would diſcharge it too quick, and cauſe the feeding to come out.

It is *frized* with the *paumelle*, the grain uppermoſt; to open the grain and cut the veins, the paumelle is paſſed, the grain on the table, to cleanſe the fleſh and open the ſkin, which makes it ſtick and extend better on the table; before it is laid on the table, it muſt be well wiped both on the fleſh and grain ſide with a hair broom; this takes off the filth that the *frizing* and *paumelling* have raiſed on the ſkin: the table muſt alſo be well cleaned; after which the ſkin is extended on the grain with the *ſleeker*: great care muſt be taken to leave no drills or folds in the turning of the groins; the *ſleeker* muſt not have too much edge, leſt it ſhould damage the grain.

After the ſkin has been extended by the inſtrument, they give it a light touch of water, and wipe it with the fleſhings, to take off the remaining dirt. They then double the ſkin (for the grained cow leather in tallow is worked whole, and not cut in two;) they then are hung in the air; if the air has ſeized the edges, which are apt to dry too faſt, they muſt be wetted with a ſwab, without which they would not take the black.

Before the black is given to the ſkin, it is a ſecond time extended ſlightly by the *ſleeker*, by way of another dreſſing; for in drying it rumples and becomes unequal: after being *extended*, it is prepared to receive the black.

To lay on the black, the ſkin muſt be in a proper ſtate, that the black may penetrate equally; it would not be ſo beautiful if applied to a ſkin thoroughly dried. They uſe the *hatters black*, or the *black of iron*, as for ſleek leather; as ſoon as they have given the black, the ſkin is put out to air until it be more than half dry, it is then blackened again; when it has ſucked up its black, it is paſſed over with the *ſleeker* on the grain, and made as ſmooth as poſſible; to make them imbibe their firſt black, as faſt as they are blackened, they are folded with the grain inwards, and if they are ſeveral, they are piled the one on the other; when they are paſſed over with the ſleeker, they receive their third black, are hung in the air, and there left to dry thoroughly. When dry they are ſmeared with beer, then folded from corner to corner, and the *paumelle* drawn over them, the paumelle is then paſſed acroſs on the grain; the grain is then wiped with a piece of old blanket to ſcour it, and another ſmearing of beer finiſhes the ſcouring of the grain.

When the ſkin is thus ſcoured it receives a form with the ſleeker, is wiped with a woollen rag, and is luſtered with juice of barberries to brighten the grain. It would be proper to leave the ſkin one hour or two in this ſtate, to harden, but this is not commonly practiſed.

This done, a finer paumelle than that before uſed is paſſed obliquely from the patte to the throat, then directly acroſs, ſo again from tail to head, rounding the grain as much as poſſible; care muſt be taken to manage the groins in paſſing from quarter to quarter, as well as rounding, becauſe theſe parts are more feeble, and would become too ſlimſy.

A ſecond ſcouring with ſour beer is given to dry and harden the grain; it is then hung in the air for one hour or two, until the grain be dry; laſtly, the juice of barberries is applied to brighten again, and this is the laſt operation. It requires twelve days for one man to finiſh one dozen of black cow ſkins.

To poliſh, they uſe a piece of bolting cloth, pluſh, or ſome ſuch ſmooth ſtuff, for the grain being ſoft, is liable to be ſcratched; the poliſhing muſt be done gently: but I ſhall treat more at large on this ſubject, when I come to the preparation of goat-ſkins. Inſtead of the black, which is a tinct of beer, they ſometimes uſe low brandy, wine that is pricked, ſumac, or water of the vat.

On preſſing occaſions, a leaven may be made with barley flour, which muſt be ſteeped twenty-four hours in beer; as much copperas muſt be boiled in two or three quarts of vinegar, in proportion of five pounds to a hogſhead, which being poured on the beer, a black is immediately prepared; but this is apt to greaſe the grain.

In defect of barberry juice, they uſe a luſtre made with ſour beer, gum arabic, and ſugar; it may be made alſo by putting ſyrup of ſugar or moloſſes into beer. One pound of moloſſes will make fifteen quarts of luſtre, and is ſufficient for ten dozen of cow ſkins.

Another kind is made of the gum of our common trees; but the juice of barberries is the beſt of all luſtres, and is not dear, a quart coſting but 12 or 14 *ſols*.

The black grained cow ſkins above-mentioned are uſed by coach-makers, ſadlers, harneſs-makers, and trunk-makers. When a very large one is found without defect, it is reſerved for the crown of a coach.

Of Cow ſkins in Oil.

Few cow ſkins are now finiſhed in oil, becauſe the ſhoe-makers of *Paris* generally uſe turned calf, that is, calf paſſed in oil, with the grain outward, and the harneſs-makers prefer the *ſleek* leather; it is certain that cow ſkins in oil do not laſt ſo long, but are more elegant and neat; and as cabrioles, and other ſmall elegant carriages, do not require great ſtrength, ſome coach-makers begin to uſe them; they coſt near the ſame as cow ſkins in tallow.

Shoe-makers often prefer oiled leather for upper leathers, on account of its being ſofter and lighter than tallowed leather; but they are eaſier penetrated by wet.

Skins to be dreſſed in oil muſt be well tanned, and more ſubſtantial than thoſe dreſſed in tallow. The firſt operation is the treading, as for ſleek leather; then they are diſtinguiſhed by the currier into thoſe intended for black, and thoſe for white.

And indeed the oiled leathers are of two kinds, the one for the ſhoe-makers uſe, and the other for the ſadlers. Thoſe which the ſhoe-makers uſe are not blackened, becauſe they perform that on the fleſh ſide with their wax, which is compoſed of mutton ſuet and lamp black; I ſhall ſpeak of it ſeparately under the name of *white cow leather in oil,* and ſhall here only treat of black oiled cow leather for the uſe of harneſs makers. The black oiled leathers are never *ſleek,* being put in grain as the tallowed hides.

The oiled leathers intended for ſadlers, that is, thoſe that are to be blackened on the grain ſide, require only to be lightly fleſhed, as the perching knife does the remainder in the ſequel of the operation; otherwiſe they are begun like the tallowed hides, they are trod, lightly fleſhed when intended to be worked with the perching-knife, but more fleſhed when that is to be omitted: they are trod with water, and in treading them care is to be taken to ſoften them well by wetting them in a veſſel ſeveral times with water, and treading them each time; they do this ſometimes ſeven or eight times.

They are *extended* or ſtretched with a copper *ſleeker,* and hung in the air, as they would be too wet to be put in oil; one hour is ſufficient in ſummer, yet ſome will not expoſe them to the open air, leſt it ſhould ſeize them too ſuddenly; when they are of a proper degree of dryneſs they are put into oil.

For this purpoſe the curriers have for theſe ſixty years paſt uſed the *dubbings* of the chamois leather-dreſſers, which is a mixture of fiſh oil and pot-aſh, uſed in ſcouring the ſkins which are made into *chamois.* Theſe *dubbings* are thicker than oil, and feed the ſkin better; it makes it ſofter, becauſe it is of a ſaponaceous or ſoapy quality, and agrees very well with the ſkin. At *Paris* moſt of the *dubbing* comes from *Niort*, *Straſbourg*, *Grenoble*, &c. Formerly they uſed fiſh oil, but it did not make the ſkin ſo mellow; the *dubbing* feeds the ſkin better, that is, gives it a greater body, and unites with it better than fiſh oil alone; but when the dubbing is thick, it carries more oil, and gives a greater ſubſtance to the leather; when it has not been well boiled and is watery, the ſkin ſuffers thereby, becauſe it penetrates badly.

Mr. *Blondeau*, phyſician at *Chauxneuve* in *Franche-Comté*, extracted the oil of the offals of bullocks, ſheep, goats, &c. and found it gave the ſkins a very good quality; the following is his proceſs.

The offals being boiled in water, the oil and all the fat is taken off, and flung into another boiler nearly filled with hot water ready to boil; this ſecond boiler is kept in the ſame degree of heat for twenty-four hours, and ſometimes longer; the pureſt oil ſwimming on the ſurface, is drawn off by a cock adapted to the boiler, and poured into a third boiler, where there is a ſufficiency of hot water to prevent the fat mixed with the oil from congealing; the water of this boiler is kept in the ſame degree of heat for twenty-four hours, and then left to cool.

The fat, which always keeps at bottom, entirely coagulates, and he draws off three kinds of oil, by three cocks, fixed the one above the other; the heavieſt oil drawn off by the third cock or lowermoſt, being applied on leather, renders it impenetrable to water, although it ſhould remain ſeveral days on the leather.

They make oil from offals at *Paris*, which might ſerve for this purpoſe, if on experience it be found good and cheap.

The common *dubbing* cannot be uſed without oil; ſome curriers mix together one quarter oil and three quarters of dubbing; others put equal parts, eſpecially when the dubbing is thick. In the firſt feeding they put more oil than in the ſecond; when they have meagre and ſtubborn ſkins, that have had too much lime, and will ſoak water, they uſe leſs oil, becauſe it penetrates too much, and the quantity of dubbing is augmented.

Dubbing is ſo dear at *Paris*, ſometimes in war, the curriers will not buy it; it has roſe from thirty *livres* the quintal to ſeventy *livres*; whereas the oil never exceeded fifty-five *livres* a quintal.

If the *dubbing* is too thick, more oil is added; if it is a good dubbing it will take half oil; more dubbing is to be laid on the head and tail parts of cow ſkins than on the bellies; on the contrary, calve ſkins require more on the belly. Some curriers warm it, particularly in winter, but this is not a general rule.

A cow ſkin generally imbibes one-fourth of its weight of *dubbing*, that is, a ſkin of fifteen or ſixteen pounds requires four pounds of dubbing; calves require more in proportion to their weight;

one dozen of calve ſkins, weighing twenty-eight pounds, take about ten pounds of oil and dubbing.

The ſkins muſt ſtill be ſo moiſt, that water may be expreſſed from them when they receive the oil or dubbing, that the oil may penetrate little by little as the ſkin dries; for this reaſon they wet the parts that are too dry, to reſtore the neceſſary moiſture, the oil not giving a ſufficient body to the ſkin, not penetrating and nouriſhing it ſufficiently when it finds the parts too dry. Nevertheleſs the dubbing muſt not be mixed with water, for that would prevent the dubbing from penetrating into the ſkin.

When the oil has been laid on the fleſh and grain with the ſwab and the hand, they hang the ſkins by the hind pattes, and let them ſoak their oil according to the wind or ſeaſon; when there is a briſk wind they require but one or two days to dry, at ſome ſeaſons they require a month; the ſun and too hot weather are dangerous, for then the oil has not ſufficient time to dilute, ſoak, penetrate, and unite with the ſkin.

Some uſe *oil* and *dubbing* on the fleſh, and oil *alone* on the grain, others put oil and dubbing on the grain and fleſh, and others put dubbing on the grain, but ſomewhat leſs than on the fleſh, as the dubbing prevents the grain from brightening.

Skins for ſadlers are not fed ſo much as thoſe intended for ſhoe-makers, the former requiring one third leſs.

When the ſkins are dry they are ſoftened by treading, then they give them more oil than dubbing; they tread them a ſecond, after which, to ſcour the grain thoroughly, they rub the ſkin with a bruſh dipt in a weak lye of pot-aſh, and immediately after they give them the black, obſerving to keep the edges clean. The black is the ſame as for ſleeked leather, and is laid on in the ſame manner, with a bruſh or a handful of woollen ſtuff.

After giving the firſt black they are *frized* acroſs, then they receive a ſecond black, which is generally ſufficient, and are put in the air to dry thoroughly. When dried they are trod, the *paumelle* paſſed over them on the fleſh ſide, and fleſhed on the edges, then with the perching knife, after which they are rubbed over with a *cork paumelle*; and laſtly oil is laid on the grain, and they are finiſhed.

A workman may finiſh one dozen of cow ſkins in oil in twelve days; they are commonly worth eighteen or twenty *livres* each; they ſerve chiefly for cabrioles and light work, as they are greatly brought down, that is, are very thin.

They make the backs in oil for harneſs-makers, both of ox and cow ſkins after the heads and bellies are cut off, leaving the back three feet and a half broad, and four feet and a half long; this is the ſtrongeſt part of the hide, and uſed for harneſs work.

Of Waxed Cow Leather.

Waxed cow leather is now very ſcarce; formerly they rubbed certain ſkins with melted wax, ſufficiently hot to penetrate the ſkin; but wax being five or ſix times dearer than tallow, renders the ſkins extremely coſtly, and they are never thus prepared but on certain occaſions where harneſs-makers require them for works of great nicety; yet cow leather in tallow, when worked with great care and firmneſs, paſſes under the name of *waxed leather.*

However, ſome are prepared with a fourth or an eighth of wax mixed with the tallow, to give a greater firmneſs; but they alſo ſell the *ſleeked leather* before deſcribed, under the name of *waxed leather.*

Of Engliſh *Cow Leather.*

Hides called *Engliſh cow leather*, or *leather after the Engliſh faſhion in oil or tallow*, are hides of cows or oxen in *ſleek* or in *grain*, and in which the natural yellow colour of the tan is preſerved, notwithſtanding they are tallowed.

To make this kind of leather, chuſe a clean ſkin, white in the grain, and of a good quality, well tanned, and not in the leaſt green; tread it with the pin-block and feet, as thoſe which are to be *ſleeked.*

This work muſt be conducted with the greateſt neatneſs, for the leaſt ſpot would ſpoil it for the uſe intended. It is hung in the air, trod with the feet, and fleſhed.

When it is almoſt dry it is paſſed over with the *ſleeker*, then folded grain to grain, and the *paumelle* drawn over it, after which the paumelle is paſſed on the grain to take out the folds; when it is thoroughly dry, and before the tallow is laid on, it is wetted on the grain with a ſwab dipped in very clean water, that the ſcores of the knife or the more feeble parts may not be pierced by the tallow.

The tallow is laid on the fleſh ſide, but it muſt not be ſo hot as for the *cow in tallow*, or for *ſleek leather*; very little ſuffices, leſt it ſhould penetrate to the grain, the colour and neatneſs of which are to be preſerved; after receiving the tallow it is ſoaked in a veſſel of very clear water for half an hour.

It is trod wet, extended, and a light layer of linſeed oil laid on the grain; they ſometimes uſe fiſh oil, but linſeed oil is preferable; it is ſpread with a ſwab of clean wool, and then put to dry. It is finiſhed like ſleeked leather, with a copper ſleeker inſtead of an iron one, which is apt to ſpot and blacken the ſkin.

When it is thoroughly dry, make a colour with *grains of Avignon* or with *ſaffron*; ſome put no colour, and only ſmooth the ſkin. To colour ſix hides, about half a dram of ſaffron is ſufficient, ſteeped in a quart of beer; this colouring muſt be extended very quick and very equally, or the ſkin will be ſpotted.

It is expoſed again to the air, and wiped with a piece of woollen cloth, or a white towel, which brightens and gives it a luſtre; it muſt not be put in the ſun, for that would make the oil penetrate to the grain, and ſpot the ſkin; for the ſame reaſon barberry juice is alſo omitted, it is ſufficiently poliſhed by wiping till it is dry.

Theſe *Engliſh* cow leathers are alſo uſed for harneſs, and coſt one-fourth more than *tallowed leather*.

Of Grey Cow Leather.

The *grey cow leather*, called alſo *fat cow*, are different from the cow leather of *England*, in that they require neither the neatneſs nor colour of thoſe before-mentioned. They give them as much tallow as they can bear, and have no regard but to the ſuppleneſs. Theſe are prepared like the black cow leather, as far as the laying in of the tallow; they are expoſed to the wind after receiving the tallow; and to make them ſtill more ſoft, it is neceſſary to give them a layer of tallow and of *dubbing* on the fleſh and grain ſide, when they are half dry; one pound and a half of oil and dubbing is ſufficient for each ſkin. Theſe ſerve for portmanteaus, bellows, pumps, and other works which only want ſtrength and ſuppleneſs.

Of White Cow Leather in Oil for Shoes.

The *white cow leather oiled* is made into ſhoes; this does not require to be expoſed to the wind, as the leather made after the *Engliſh* manner, becauſe that is only to give it neatneſs; it is trod, and lightly fleſhed, becauſe it is to be paſſed over with the perching-knife at the end of the operation;

tion; it is put in oil and dubbing on the fleſh and on the grain ſide; it requires about three pounds of nouriſhment for each ſkin, for they muſt be well fed. They dry it, tread it, fleſh it on the ſides, perch it, and draw the *paumelle* over the grain, to take off the wrinkles, and afterwards paſs the cork paumelle over it, to lay the fleſh and heighten the grain. It is uſed by ſhoe-makers for ſhoes with the grain on the inſide, and blackened on the fleſh ſide.

Of Calve Skins.

Calve ſkins are generally worked like cow ſkins, and are employed to the ſame uſes; they make *tallowed calf leather*, *calf leather after the Engliſh manner*, and *calf leather after the Ruſſian manner*: the work is the ſame with that of cow ſkins, but as they are not ſo ſtrong, they manage them more ſparingly, and give them leſs nouriſhment; the common preparation of calves, is that of calf in oil.

To make *oiled calve ſkins*, take the beſt ſkins, or thoſe that have the grain entire. The currier receives them juſt as they come out of the pit; he airs them, fleſhes them ſlightly, and treads them for a few minutes, after which cold oil is laid both on the grain and fleſh ſide; ſome heat the oil in winter, but this not a general practice.

Calve ſkins of thirty and thirty-ſix pounds to the dozen, take twelve or fifteen pounds of dubbing, each ſkin in general requires one pound of oil and one of dubbing.

Thoſe which have had too much of the lime pit, take leſs nouriſhment than thoſe which have been well tanned, becauſe, becoming dry and thin by the effect of the lime, they cannot imbibe the ſame quantity. Exceſs of oil or dubbing is alſo to be avoided, as it makes the ſkins too ſupple and flabby.

Calves being put into oil are dried and cleanſed; this operation conſiſts in treading them, to ſoften them and take off the tan and foreign matter that ſtuck to them; this ſoftens the ſkin and raiſes the grain.

Before they receive the black, they uſe pot-aſh, to ſcour, ſoften, and prepare the grain to take the black. For this purpoſe, they diſſolve one pound of pot-aſh in a pail full of water, with which they are bruſhed.

When ſcoured, the black is immediately applied, which is the ſame as for cows; if too much is applied, it will pierce the ſkin. After blackening, they are *frized*; but for thoſe which are ſtrong in the neck, it is neceſſary to paſs over the grain with a larger *paumelle*, than that uſed for *frizing*: they are *frized* acroſs which cuts the veins of the ſkin, and prevents thoſe long furrows which are often ſeen in different directions; they then give a ſecond black to the ſkin, and hang it in the air to dry thoroughly. They then tread it, to ſoften and cut the nerves, to make the grain come out, and to open the grain; this is what is principally regarded in *oiled calves*.

They are laid on the table folded grain to grain; the paumelle is paſſed on the fleſh ſide, and then on the grain, to ſoften the ſkin, and to take out the wrinkles of the treading. They are fleſhed on the edges with the *reverſed knife*, all round the ſkin, to facilitate the fleſhing, which is afterwards to be done with the *perching knife.*

Where the reverſe knife cannot be procured, it might be done with the perching knife, which does not ſo much impoveriſh the ſkins as the other knife, but requires more time; it may be pared round the edges by the hand; they perch ſix or eight in one hour. When they are perched, the *cork paumelle* is paſſed on the grain ſide with a little oil on the grain to deepen the black, whoſe tinct has been weakened by the working; this is always done with fiſh oil.

Theſe black calves are ſold from thirty-two to thirty-ſix *ſols* a pound; one dozen may weigh from twenty-two to four-ſcore pounds: the lighter they are, the dearer they are ſold by weight, becauſe there is more trouble in one dozen of thirty pounds, than in half a dozen of the ſame weight.

To work calves in tallow, take them dry from the tanners, ſprinkle them with water, and lightly paſs them over with the blunt knife.

The heads being the thickeſt parts are *taken down* quite to the throat, that is, they are pared with the reverſe edged knife, being firſt moiſtened with water, that the knife may work better on the ſkin. The heads being dried, the ſkins are pounced on the fleſh ſide with a *pumice ſtone*, to take off the inequalities of the fleſh. They are then doubled grain to grain, and a fine paumelle paſſed on the fleſh ſide, and the cork paumelle paſſed on the grain; but before theſe two operations a light watering muſt be given on the grain to ſoften it. When dry, they are put into tallow like cows; calve ſkins weighing thirty-eight or forty pounds to the dozen require about twelve or fifteen pounds of tallow. After tallowing, they are aired and finiſhed like black cow ſkins; they are trod with the water in, are frized, ſcoured, put in black twice, folded grain to grain, the paumelle paſſed on the fleſh ſide, then on the grain, again on the fleſh, and then luſtred or poliſhed.

Tallowed calves are uſed by ſadlers, harneſs-makers, trunk-makers, and alſo upholders for chairs and tables, tho' the laſt more commonly uſe *Morocco* leather. A calf ſkin in tallow is worth about five *livres*.

The *Engliſh* calf is made like the *Engliſh* cow leather, chooſing thoſe of the beſt quality.

The firſt operations, till the receiving of the tallow, are the ſame as for calves in tallow; the tallow is laid ſparingly on the fleſh ſide, leſt it ſhould ſpot the ſkin.

Strong calves are paſſed in white; they ſerve for the upper leathers of coarſe ſhoes, the ſame as the white cow oiled leather.

The firſt work of a white calf ſkin is the ſame with that of a black one; after oiling and cleanſing, it is fleſhed on the ſides and perched from tail to head, then trod till it be thoroughly ſoft; two calves are trod at once, laying fleſh to fleſh to keep them neat; the *paumelle* or graining board is paſſed on the grain, they are worked acroſs with the perching knife, becauſe the fleſh muſt be ſmooth, and this repairs the defects of the perching from tail to head. At length they are paſſed over with the *cork paumelle*, and this is the laſt work of white calves.

The ſhoe-makers diſtinguiſh the *turned calf* and the *black calf*. The turned calf is oiled, and the grain or hair ſide is turned uppermoſt, as hath been in practice theſe ſixty or eighty years. The black calf is the white calf in oil, which the ſhoe-makers uſe for coarſer ſhoes: the fleſh ſide is out and the grain inwards; this does not appear ſo well to the eye, and the ſhoe-makers blacken it themſelves.

Calve ſkins are ſold by the pound, and not by the dozen, as goat ſkins; the ſmaller and finer they are, the more they will ſell for; they weigh from two to eight pounds, when prepared, and often coſt from thirty to thirty-two *ſols* the pound; the profits cannot be ſo conſiderable on calves, as on ſtrong leather.

Calve ſkins being tender and delicate, it often happens that in taking the hair off, and in the river work, the grain is ſpoiled or ſcored by the knife, and torn; theſe ſkins ſerve for the grain inward, or for chamois.

There are ſmall calves ſtill-born called *ſlinks*, which are put into the vat, and afterwards into the tan-pit, for three or four months, without being at the trouble of taking the hair off; they are ſcoured like the others.

Of Goat Skins.

Goat ſkins require more working than calves, and more gentleneſs and management, becauſe they are not in general ſo ſtrong.

Thoſe goat ſkins worked at *Paris* are chiefly brought from *Limouſin*, *Auvergne*, *Franche Comte*, *Switzerland*, and *Provence*, where they are tanned with *redou*, a plant I have deſcribed in the former part of this treatiſe. Goat ſkins in this ſtate are called by the curriers of *Paris marroquins in baſil.* They ſteep them for twenty-four hours in a veſſel, tread them three by three, and then drain them on the beam with a blunt knife, on the fleſh ſide only; when they are almoſt dry, they are put into *oil* and *dubbing*. One dozen of goat ſkins, weighing eighteen or twenty pounds, require ſix or eight pounds of oil; being oiled, they are trod, worked with the *paumelle* more gently than calves, and cleanſed by treading.

They ſcour the goat ſkins with a weak lye of pot-aſh and a bruſh; a quarter of a hundred of pot-aſh boiled in two pails of water, will ſcour ſix dozen of goat ſkins. The alkaline ſalt diſſolves the ſuperfluous oil, and takes off the filth which the oil had left on the grain of the ſkin; this brightens and ſoftens the grain; they afterwards *frize* them from tail to head, and acroſs the grain upwards, then *paumelle* on the fleſh, and this gives the grain to the ſkin.

Before they receive the black they are laid on a table, and rubbed over with a reed called *Spar* or *Bas*, to ſoften the grain, which is naturally hard and rough. This plant is called by *Pliny Spartum*, the bales or matts which contain the *Barilla* from *Spain* are made with this plant; a handful of this rubbed on the ſkin extends, dreſſes, and ſoftens it.

After *ſparring* them they are ſmeared with black, put to dry, and a ſecond black given them; this black is permitted to ſoak for ſome hours, after which they are brightened on the grain with beer or vinegar; they then give a ſecond *ſparring*, and hang them out in the air; when dry they are trod, doubled grain to grain, paumelled on the fleſh ſide over the four quarters, and over the grain, wiped, and brightened, or luſtered.

To luſtre them, they muſt be firſt rubbed with a piece of liſting dipt in the luſtering-pot, ſprinkled and rubbed over the whole ſurface; it is then rubbed again with ſpar with both hands ſtrongly, in all directions, and for a conſiderable time, that the luſtre may be heightened; in fine, the ſkin is cleared up by rubbing it with the ſame piece of liſting uſed dry.

After they have received the luſtre they are pared round the edges, and perched with the perching-knife. There are ſome provinces where the ſkin is not pared, but worked with a pumice ſtone ſet on a haft like the *paumelle*, and they uſe alſo the pumice ſtone to cut the grain inſtead of the *paumelle*.

After perching, the *paumelle* is drawn over the fleſh ſide from tail to head and acroſs, to raiſe the grain, but very lightly, that it may not tarniſh it; they are then wiped, and linſeed oil applied to them, which deepens the black, and preſerves its brightneſs. It muſt be obſerved, that if they fail in the firſt black, by neglecting to ſcour the ſkin well, or by any other careleſſneſs, the ſkin will never be beautiful.

It is good work to blacken and cleanſe eighteen or twenty goat ſkins a day, I mean the firſt black; for as to the ſecond black, two dozen may be done in an hour.

Goats in oil weigh about eighteen pounds the dozen, and are ſold by weight from three *livres* to three *livres* fifteen *ſols* a pound. There are ſome that weigh forty pounds the dozen. There are even goat ſkins of ſix pounds each, but they are ſcarce, and are commonly the ſkins of buck goats.

Thoſe which are to be tallowed, require no oil or *dubbing*; but they put none in tallow at *Paris*. The *marroquin* or *Spaniſh* leather of *Rouen* is only goat in tallow or in hogs lard; and the curriers of *Paris* commonly call *marroquins* thoſe goat ſkins in oil; theſe are their fineſt ſkins.

Of Sheep ſkins.

They ſometimes put ſheep ſkins in tallow, but more commonly in oil, though they are finer in tallow; yet theſe coſt more, and take a longer time.

At *Paris* they make both white and black ſheep leather: they generally chuſe ſheep ſkins that are low in the grain, or ſlightly ruffled, which they get from the country ready perched, or after the firſt work, and they are blackened by the curriers at *Paris*.

They alſo uſe ſheep ſkins tanned, which they wet, fleſh lightly, and extend: they are then ſparingly oiled, both on the fleſh and grain ſide: one pound of oil is ſufficient for a dozen ſheep ſkins, weighing eighteen pounds. When the oil is dry, the black is laid on; for which purpoſe they firſt uſe pot-aſh to ſcour the ſkin; when that is done, they apply the common black; but it muſt be laid on ſparingly, becauſe oil not having ſo much body as tallow, the black would penetrate and make the fleſh unſightly. To keep the fleſh ſide clean is an attention to be paid by good workmen in all kinds of ſkins, for that is the ornament of the ſkin, and thoſe that neglect it are ſlovens, and ſcarce deſerve the name of curriers.

When the ſkin is blackened, it is doubled grain to grain, and a fine *paumelle* drawn on the fleſh ſide from quarter to quarter, and from tail to head; this muſt be done whilſt wet, for if the fleſh was dry, the *paumelle* would not take, and the grain would not be equally formed; this done, it is hung in the air, and when dry it receives the ſecond black, then hung out, to dry thoroughly, after which they give the third black. If ſeveral dozens are worked at one time, only one ſkin at a time muſt be blackened, for they muſt be perched whilſt the black moiſtens the fleſh, for if the fleſh was too dry, it would ſcale, appear rough, and be apt to tear.

Sheep ſkins are perched with *German* perching-knives, which are thinner, and not ſo heavy as thoſe uſed at *Paris*; this perching-knife muſt not be ſet on the oil-ſtone, but only on a whet-ſtone, which gives it a dead edge; ſo that it is rather *ſcratching* than *perching*; when perched, they are put out to dry, oiled on the grain, to deepen the black, and brightened.

When intended for tallow they are lightly fleſhed and rubbed with a pumice-ſtone; this done, the fleſh ſide is ſprinkled with water, the *cork paumelle* is drawn on the grain, it is put into tallow, and trod with the water in, ſo that it may become ſupple; after this treading, it is *frized*, extended, blackened, and hung out to air.

When it is half dry, it is paſſed over with the iron *ſleeker* on the fleſh ſide, after which it receives a ſecond black, then hung in the air till thoroughly dry, folded grain to grain, and the *paumelle* paſſed on the fleſh ſide from quarter to quarter; a *cork paumelle* is then drawn over the grain from tail to head; the *paumelle* then run acroſs the fleſh from tail to head, on the borders, which gives a grace to the ſkin; a waſh of beer is caſt on the grain, which is wiped off when dry, and this brightens it, as before deſcribed; a ſkin that has a fine black, and is very clear, fetches the higheſt price, therefore the currier ought not to neglect this part of the finiſhing: they muſt be dried in the ſhade, for the ſun imbibes too much of their moiſture, they ſhould not be left too long in the air, leſt they ſhould grow hard.

The price of ſheep ſkins worked by curriers cannot be fixed; ſome coſt but eight *livres* a dozen, whilſt others bring 48 *livres*, in proportion to their ſize: they are never ſold by weight, yet they are generally eſtimated at twenty *ſols* a pound.

Of Ruſſia *Leather.*

Ruſſia leather, ſometimes corruptly called *Rouſſet leather*, is cow or calf leather dyed red, cylindred, hardened, and impregnated with an oil that is almoſt *empireumatical,* whoſe ſmell is extremely ſtrong, but which renders the grain fit to reſiſt water. The *Ruſſia* leather is in great eſteem with ſadlers; it is uſed for the inſide of coaches, cartouche boxes for ſoldiers, and ſeveral other works that require neatneſs and elegance.

Cow hides are chiefly uſed for this work. They take a ſkin in the tan, the whiteſt, cleaneſt and moſt perfect; it is ſoaked in water, lightly fleſhed with a round knife on the beam; the extremities and weak parts of the belly, which do not take the colour well, cut off; it is fleſhed on the beam, trod, worked with the *paumelle*, and ſmeared on the grain with clear fiſh oil, and oil with *dubbing* on the fleſh; when dry it is again worked with the paumelle.

A waſh of alum-water is then laid on the grain, and whilſt yet moiſt it is paſſed with a cylinder, (hereafter deſcribed) they then give it a ſecond waſh of alum water; when a little dried, they apply on the grain ſide an oil called *Ruſſia oil*; the ſkin is then coloured red or black, and expoſed to the heat of the ſun, to make the colour penetrate; the colour is laid on at ſeveral times, and each time the ſkin is dried, until it is well coloured; it is then trod again, worked with the paumelle, fleſhed to the quick on the beam, and alſo with the perching-knife; at length it is brightened by rubbing it on the grain with a very rough bruſh.

There are at *St. Germain* ſeveral tanneries, where they prepare ſtrong hides by barley; but the moſt important is that which is near the hoſpital, and which is commonly called the *tannery of the Jews.* The chief part of the workmen are *Germans*, and the eſtabliſhment itſelf was formed on the project of a *German* named *Teybert*, who about twenty years ago brought into *France* the ſecret of *Ruſſia leather*, and the method of making *Walachian* and *Tranſylvanian* hides, already deſcribed.

This man pretended that *Ruſſia leather* was the chief part of his ſecret; he ſaid he had learnt the method of making it in *Muſcovy*, at the riſque of his life. The chief part of the ſecret it ſeems is in the *Ruſſian oil*, which renders it very ſoft, prevents its being cracked and penetrated by rain ſo eaſily as other leather, and gives it a particular ſmell, which the workmen hold in great eſteem.

The machine with which they give that grain, or impreſſion of a multitude of ſmall lozenges to the *Ruſſian* leather, conſiſts in a ſteel cylinder of about one foot in length, and three inches diameter: this cylinder is cut with a multitude of ſmall ridges very cloſe together, like the threads of a ſcrew, not ſpirally, but circular; it is loaded with a maſs of ſtones weighing three or four hundred weight; it is run over in two directions, on a wooden bench, by means of a rope which paſſes over a wooden cylinder with a handle; the rope alſo paſſes over two cylinders or rollers fixed to the cieling, and over a fourth roller at the extremity of the bench; the cylinder which has the handle has two ſeparate parts, on which the two ends of the rope paſs in a contrary direction; by this means one handle gives to the cylinder two motions, *viz.* forwards and backwards.

The cylinder is ſupported and directed by iron bars ranged along the bench on which it is to roll; the leather being a little moiſtened, is extended on the bench, and the cylinder is paſſed on the leather; the mark of the threads which are on the cylinder remain impreſſed on the leather lengthways, and by changing the poſition of the ſkin, new ſtrokes are made, which cut the firſt at right angles or pretty near; the interſection of theſe lines forms ſquares or lozenges on the grain of the leather, which pleaſe the public eye, becauſe they find them on the *Ruſſian leather:* this operation, ſo ſimple in itſelf, is notwithſtanding one of thoſe things on which much importance is laid; this proves the utility ariſing from the diſcloſure of the mechanick arts, by baniſhing thoſe myſterious trifles which retard their progreſs.

The *Ruſſian* leather being thus printed, is ſmeared with *Ruſſia* oil, which ſtrengthens the grain, and hardens the ſurface of the leather, ſo that water cannot penetrate; this oil is the grand ſecret, as they pretend, therefore I cannot preciſely tell the compoſition; but I know that it is compoſed of oil diſtilled from *ſavin* and *rue*, two plants ſufficiently known; the leaves and ſtems are indiſcriminately uſed; the quantity of three or four pounds are put into glaſs mattraſſes, which are covered with heads luted with maſtich; a fire is lighted under them, and in the ſpace of thirty hours there comes over one or two pounds of *empyreumatical* oil, which they uſe to impregnate the *Ruſſia leather*; I have alſo heard that they uſe the bark of birch reduced into powder.

The red colour which is uſually given to *Ruſſia* leather, is likewiſe kept a ſecret. It is chiefly made with *Braſil* wood, and eſpecially with that of *Fernambouc*: it is well known that this wood is greatly uſed in dying, with alum and tartar, without which its colour would not be ſolid: they extract from it, by means of acids, a kind of carmine; they alſo make *liquid lacques* from it for miniature paintings. (See *Lemery*'s dictionary of drugs.) The manner of uſing it for *Ruſſia leather*, is to boil it for five or ſix hours with ſome other ingredients, which they keep unknown to us. The proprietors of the *Royal Manufactory* of *St. Germain-en-Laye*, have only one perſon who has the knowledge of it, and the proceſs is preſerved under ſeveral keys, as being the moſt precious treaſure of that company; nevertheleſs nothing is eaſier than to make as ſolid and a beautiful dye as theirs*.

The *Fernambouc* wood uſed for *Ruſſia* leather, makes a falſe tinct, as moſt of the colouring woods do, for its colour will not reſiſt the proof of tartar, but ſufficiently reſiſts air and rain; they uſe it for *Ruſſia* leather as the more ſolid *red* dyes bear too great a price for this manufacture. Sometimes three layers of colour are ſufficient, and ſometimes they are obliged to lay on ten or twelve, and theſe do not always ſucceed; there are *Ruſſia* leathers which have always a black caſt, and the cauſe could never be diſcovered.

France ſtill imports from *Ruſſia* a great quantity of this leather; the manufacture of *St. Germain* does not furniſh more than the value of twenty-thouſand livres a year, and which ſerves chiefly for the uſe of the troops; the price of *Ruſſia* leather is about thirty-ſix *ſols* a pound; which is only a fifth more than the price of black cow leather, but it is in general heavier than other kinds of leather.

The *black Ruſſia* leather is made with the ſame oil, and paſſed under the ſame roller; they give it two or three ſmearings of black, as to black cow leather: it differs from it only in the hardneſs of the grain, and the ſmell, which the *Ruſſian* oil communicates to it.

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* One would be apt to think this ſecret is not ſo wonderful, ſeeing the manufacture makes but a ſmall quantity of *Ruſſia* leather, and the demand ſo great, that the *Sieur Teybert* has been diſmiſſed at leaſt theſe twelve years paſt, with a penſion of only 600 *livres.* He has offered ſeveral times to ſell his ſecret for 600 *livres*, but found no purchaſer.

Of Red Cow Leather.

Tho' the curriers of *Paris* do not make *Ruſſia* leather, yet they make *red cow* leather, which has no ſmell, is of a finer colour, but leſs ſolid than that of *Ruſſia*, the colour is given with *Braſil* wood boiled in lime water, and a ſmall portion *of cochineal*. The ſadlers, harneſs-makers, and trunk-makers uſe theſe cow or calve ſkins for equipages.

Cow hides that are to be coloured, are not to be tallowed, but a little clear oil only is applied to them very lightly, juſt to ſoften the ſkin; ſuch ſkins are to be choſen as are without defect, free from the ſcorings of the knife, from being horned, or ſcratched, and ſuch as have a quick or lively grain, that is, fine, firm, and well preſerved.

To make this leather take a cow hide with the tan on, whoſe grain is lively; it muſt be trod, ſoftened, fleſhed, and trod again whilſt wet, then hung in the air like the ſkins after the *Engliſh* manner; a layer of oil is ſmeared on the grain, and a layer of oil and *dubbing* on the fleſh ſide; this requires about half an hour in all, and it is put to dry.

When dry, they gave it a waſh of alum with a bruſh, from tail to head, and acroſs; the alum ſerves to eat the remainder of the greenneſs of the ſkin, and to *dreſs* the ſkin, as the curriers call it; in ſhort, it prepares the ſkin to receive the colour.

It is trod in its alum, until it is ſoft, in ſmall folds, doubled grain to grain; the paumelle is drawn on the fleſh ſide alternately on the four quarters; it is hung in the air to evaporate the moiſture of the alum, when dry the *cork paumelle* is paſſed on the grain.

To prepare the *red*, into eight pails of well water, in a very clean veſſel, put ten pounds of quick lime to ſlacken. Two days after this water is taken out without diſturbing the grounds, and poured into a copper boiler; take *Braſil* wood freſh cut, of that which is not ſoft or white, and boil it over a quick fire; eight pounds of wood makes two pails of red, and ſuffices for eighteen or twenty cow ſkins, each pail containing eighteen or twenty quarts.

It would be better to buy it in the ſolid piece, and cut or raſp it occaſionally when wanted; leſs would ſerve than when bought in chips, and it would loſe leſs of its ſtrength.

Theſe two pails of red are to be boiled 'till reduced to one; then the firſt red is drawn off, and the boiler is filled with lime-water out of the ſame veſſel, which is likewiſe boiled half away on the ſame wood; this ſecond pail is mixed with the firſt. Add about half an ounce of well powdered *cochineal*, which muſt have but one boil, and then is taken from the fire, and whilſt yet boiling, about the bigneſs of an egg of unſlacked

lime

lime is caſt into it; and when cool it is fit for uſe.

The firſt waſh of red is given from tail to head and acroſs, and the ſkin expoſed to the air; the ſecond red is given after the ſame manner, and it is left to dry thoroughly; it is then doubled grain to grain, the paumelle drawn on the fleſh ſide, from head to tail and acroſs, after which the third red is given, to which they add the white of an egg.

The third red being given, the ſkin is hung in the air to dry, after which it is ſmoothed or ſleeked; and that the ſleeker may ſlide the eaſier, a piece of woollen rag lightly oiled is paſſed on the ſkin; then *ſleek* from tail to head and acroſs, on the grain ſide, and the red cow leather is finiſhed.

Some curriers prepare their red dye after another manner. They begin by making an alum water, compoſed of three gallons of water to one pound of alum; it muſt be placed on a ſlow fire, juſt ſufficient to melt the alum; this ſolution is then put into a large crock, and ſix quarts of clean common water is poured over it, which is ſufficient to alum three dozen of calve ſkins.

Three pounds of *Braſil* wood, with a piece of roche lime, of the ſize of an egg, is boiled ſtrongly in about fifteen quarts of water, for five or ſix hours; this decoction the curriers call *Braſil.*

The ſkin being in the ſame ſtate as if to be blackened, is rubbed over with a piece of wool dipt in the alum water, and when thoroughly dried it is rubbed with the *Braſil*, after which it is again dried, waſhed again with the alum water, a new ſmearing of *Braſil* put on, and the ſame repeated a third time.

The ſleeker which ſome curriers uſe for red cow leather is made of glaſs in the form of an onion, three or four inches broad by one inch thick, convex at bottom, and having on the top a kind of ſtem or cylinder, which ſerves as a handle; ſome have two handles, which is ſtill better. After rubbing the ſkin with a little barberry juice, it is dried, then ſleeked ſtrongly; and this is the laſt operation given to calve and ſheep-ſkins made in red.

Red cow leather is not ſold by weight; the ſize and quality conſtitute the price; but in general a ſkin of twelve pounds will ſell for eighteen or twenty *livres*, and ſometimes for twenty-four *livres*.

OF

MOROCCO LEATHER.

MOROCCO leather was formerly manufactured in *Aſia* only; it is now made in great perfection in *France*. In this treatiſe I ſhall deſcribe the methods practiſed in *Africa* and at *St. Hippolyte* in *France*. The city of *Morocco* was once famous for this manufacture, and from thence this kind of leather took its name.

The manufactory at *St. Hyppolite* is carried on by Mr. *Barois*, whoſe ſucceſs proves his abilities. It was eſtabliſhed in 1749, and in 1765 he obtained letters patent to enjoy the privileges of a royal manufacture. But as the *Moroccos* of the *Levant*, and in particular thoſe of *Nicoſia*, in the iſland of *Cyprus*, and of *Diarbékir* in *Aſia*, are greatly eſteemed, I ſhall here give the methods practiſed at thoſe places from the deſcription of M. *Granger*, who worked on the ſpot, and communicated his diſcoveries to the academy at *Paris*.

M *Granger* was a very ſkilful and active ſurgeon, who was ſent by the count *de Maurepas*, then miniſter of the marine, into the *Levant*, *Egypt*, *Meſopotamia*, and *Perſia*, at the expence of the king of *France*. To purſue his diſcoveries he underwent the greateſt bodily fatigues, often travelling barefoot, and complying with all the rude and barbarous cuſtoms of the *Arabian* artificers. To this gentleman's knowledge and perſeverance *France* owes many uſeful improvements in arts and in phyſick, each of which have been honoured with an ample detail in the memoirs of the academy from the year 1735 to the year 1745.

The obſervations and accurate detail of the proceſſes in this manufacture, made by a man of ſo much knowledge and abilities, may be relied on, notwithſtanding the boaſted myſtery and ſecrecy of the *French* manufactures at *St. Hyppolite.*

The ſkins uſed for *Morocco* are thoſe of the common goat, and of wild goats when they can be procured; the beſt are brought from *Auvergne*, *Limouſin*, *Touraine*, *Burgundy*, and eſpecially the *Bourbonois*; they alſo come from *Switzerland*, from *Cork* in *Ireland*, and even from *Barbary* and the *North.*

In the *Levant* they prefer the ſkins of he-goats, becauſe ſtrongeſt, but in *France* they ſeldom uſe any but young he-goats, the others are too ſtrong and too coſtly. The belt makers prefer the ſkins of he-goats, being ſo ſtrong as to require no lineing. The tapeſtry-makers alſo uſe them for the backs of elbow-chairs and the tops of writing-deſks.

Theſe ſkins are dried in the hair, and not thoſe which have been limed, peeled, and dried, becauſe the grain would be too low, and would appear ugly; for after the brightneſs of the colour, the grain conſtitutes the beauty of *Morocco.* Beſides, ſkins twice dried becomes too ſtiff and ſtubborn, and are reſerved for the *Chamois* leather-dreſſer, under whoſe hands the oil and the mill reſtore the ſoftneſs.

Of liming the Skins.

SKINS intended for *Morocco*, being dry and in the hair, are firſt ſteeped in ſtagnated water for three or four days to ſoften; they are afterwards pared on the beam, then ſteeped again for twenty-four hours longer, when they are a ſecond time pared on the beam; they are then put into ſuch lime-pits as are ſpent with ox or calve ſkins; they are two days in the pit and one out, much in the ſame manner as calve ſkins; ten dozen are commonly ſteeped at once, which remain about one month in the different pits before the hair is taken off, obſerving to take them out and to pile them night and morning. When the hair is off they are twice pitted, in order to raiſe them, viz. once in a ſecond freſh pit, where they remain three days in lime, and five days in pile; and twice in a new pit, which muſt have been made four days before at leaſt, that it may have had time to cool and to ſlacken. In ſummer the ſkins fill ſooneſt, becauſe the heat forwards them.

At *Nicoſia* they put the ſkins intended for *Morocco* into lime reduced to powder, for twenty days in ſummer, and twenty-five or thirty in winter; they are afterwards waſhed in freſh water, the hair taken off, and fleſhed, then powdered lightly again with lime; they are ſteeped in ciſterns of water for one hour, and ſtrongly waſhed; then waſhed ſeveral times in other ciſterns made for that purpoſe, and trod with the feet for one or two hours; the water is frequently changed by means of two cocks, one of which lets in the clean water, whilſt the other diſcharges the dirty; when they are well cleanſed and very white they are extended on poles to drain.

At *Diarbékir*, a city of *Turkey* in *Aſia* in *Diarbeck*, formerly *Meſopotamia*, they lime pretty near as our *Tawyers*. Some pretend the water of the river *Tigris* is eſſential to the beauty of *Morocco*, but that is a miſtake, for there they uſe well water, or that of a ſmall rivulet whoſe ſpring riſes three leagues from *Diarbékir*, brought thither by an aqueduct. At this place the goat ſkins are ſoaked twenty-four hours in water, and ſcraped to take off the greaſe; when they are very clean they are ſmeared over on the fleſh ſide with a liquid paſte of lime, folded and piled, and thus left for three days; after which they are expoſed to the open air, by extending them in the ſhade in ſummer, and in winter giving them the ſun; they are turned now and then, and when dry, the fleſh and hair are taken off: they are laid in pits made like ours, where they remain two or three days in ſummer, and ſometimes a fortnight in winter; after which the curriers take them out to renew the water of the lime, in which they ſoak and waſh them five or ſix times; they are then ſoaked a ſecond time in the ſame water during ſix days; theſe pittings (which without doubt are weak) are five times repeated, and care is taken to waſh the ſkins five or ſix times at each change of water. They are then drained, and worked on the fleſh ſide with a blunt iron, until they are very clean and ſmooth. They again are ſteeped in lime water, obſerving to ſtir them each day, raiſing them one after the other.

After theſe ſix laſt days in the pit, they are taken out, and waſhed ſeveral times in freſh water, until they are perfectly clean; this is continued for three days ſucceſſively, they then are extended to be half dried, in which ſtate they are put into dogs excrement.

With us, all ſkins after being limed are haired and river-worked, as I have ſhewn in the art of tanning; but *Morocco* cannot be too much worked in the river, for if any lime remained the ſpots would appear on the colour, and change it to a dirty purple.

When the ſkins are taken out of the laſt pit they are thrown into the river for three or four hours, and ſtirred each quarter of an hour to waſh out the groſs parts of the lime, after which they are fleſhed, then put into buckets, where they are ſtamped with wooden peſtles for half an hour, then put on the beam to be worked with the ſleeking-ſtone on the grain, and immediately after they give them a faſhion with the knife on the grain and fleſh; this operation is repeated five or ſix times; they then are ſtamped again with the peſtles, by three men to every two dozen of ſkins. Some have their buckets bored full of holes at the bottom, in which they are there ſtamped for one hour, flinging freſh water at times over them.

They muſt be ſtamped at each operation of the river work, that is, at the fleſhing, counter-fleſhing, or ſecond fleſhing, &c. as hereafter deſcribed.

At the manufactory at *St. Hyppolite*, they follow the order of river-working in the following manner. When the ſkins are taken out of the lime pit they are ſteeped in a vat of water to rinſe them, and then fleſhed; this is the firſt operation. They then are ſteeped five or ſix hours in another vat of water, and counter-fleſhed; this is a ſecond fleſhing, which forms the ſecond operation.

They are ſtamped for the firſt time, and ſteeped in another vat of clear water; they are ſtamped a ſecond time, and worked on the fleſh; this is the third operation. They are ſtamped the third time, ſoaked in a vat of water; ſtamped a fourth time, ſleeked with a kind of ſlate with a wooden handle, and this is the fourth operation; they work them immediately with the round knife on the grain, and this is the fifth and laſt operation of the river-work.

Of Dogs Confit or Maſtering.

The river work finiſhed, the ſkins are put into the *dogs confit* or *maſtering*; for every four dozen of ſkins, they add one bucket of dogs excrement, containing fourteen or fifteen quarts, which is worked up with their hands into a kind of pap, and well diluted. The ſkins are flung in, ſtirred and worked in the *maſtering* for ſome minutes, then turned and left to reſt.

They remain about twelve hours in the *maſtering*, which opens them and takes off the rawneſs, diſpoſes them to relax, fill, and ferment; this excrement, by its alkaline parts, alſo cleanſes them, and takes out that greaſe which would hinder them from taking the colour. I ſhall hereafter ſpeak of *bran maſtering*.

At *Nicoſia*, they ſpread the maſtering on the ſkin, about one ſixth of an inch thick, and eſteem this operation moſt eſſential to the preparation of *Morocco*: for which reaſon, whenever they carry on this trade in that country, they gather the dogs excrements with as much care as country people do the dung of other animals for the manure of their lands.

In *July*, 1735, the plague raging greatly in the iſland of *Cyprus*, a perſon repreſented to the governor of *Nicoſia*, that the dogs contributed greatly towards that diſorder, upon which he ordered all the dogs to be killed. The curriers and merchants hearing of this order, went in a body to the governor, repreſented that the commerce of *Morocco* was of great importance to the city, and that it would be ruined, if the dogs were deſtroyed, as their dung was abſolutely neceſſary in the preparation of *Morocco*. This remonſtrance appeared of ſo much conſequence that the edict was revoked at all hazards. *Maſtering* or *Fecal* matters are alſo uſed to prepare cotton to receive the fine red of *Adrianople*, according to a memoir, publiſhed in 1765, at the expence of the crown, by order of the miniſter, the ſubſtance of which was as follows.

Dying of Cotton with Madder of a fine Scarlet.

Dilute twenty-five pounds of ſheep's dung in five hundred pounds of *lye* of *Barilla*, with twelve pounds and a half of olive oil; in this ſoak one hundred weight of cotton already ſcoured in a ſtrong *lye* of lime water; this operation is repeated three times, and is called *Sikiou*. When the cotton has been *galled*, *alumed*, *dyed* with the *blood* and *madder* of *Smyrna*, and rouſed with aſhes and ſoap, it is dipped again in the *ſikiou*, and this fecal matter makes the red more lively than the fineſt carnation of *Adrianople*.

At *Diarbékir*, they make uſe of theſe *maſterings* in a different way. Whilſt the ſkins are drying, they fill great hollows made in the earth, like our lime pits, with dogs dung, which is diluted to the conſiſtence of honey or of thin pap, in which they ſoak the ſkins for eight days in winter, and three in ſummer, treading them each day with the feet. They are taken out of this fecal matter and well waſhed with freſh water, after which another *maſtering* is made with bran diluted in water, in which the ſkins are ſoaked ſix days in winter and three in ſummer, obſerving to tread them each day with the feet, the ſame as in the dogs *maſtering*; they are then taken out, waſhed in freſh water, and dried for dying.

Of the Sumach Vat.

After the maſtering with dogs excrement, the curriers in the iſland of *Cyprus* put the ſkins into another kind of pap, made with the leaves of *ſumach* reduced into powder. The ſhrub which affords theſe leaves is alſo called *Rhus* or *Rhoé*: *Rhus folio ulmi Caſpari Bauhini in Pinace*, p. 415. & *Tournefortii Inſtitutionum*, p. 611. *Rhus foliis pinnatis obtuſiuſculè ſerratis ovalibus ſubtus villoſis*, *Linnæi Specierum*, 1. ed. p. 265. It bears ſmall flowers in the form of a roſe, which form large white knots; its fruit is a round capſula filled with one ſpherical grain, flat, round, and hairy, called *rubeum*, or *rhus obſoniorum*, becauſe the cooks uſe it; its leaves are long and crenellated. This ſhrub grows in great plenty in the rocky parts of the iſland of *Cyprus*, in *Spain*, and even in *Languedoc* and *Provence*; it is refreſhing, drying, and aſtringent; as an aſtringent, it is of uſe to *Morocco*.

The leaves of the *Sumach* being reduced into powder, a thick pap is made thereof, in which the ſkins are ſteeped one by one, aud then thrown into ſquare reſervoirs, where they remain to macerate for thirty hours; then they are worked with the feet and hands, after which they are waſhed and cleanſed.

This *Sumach* vat practiſed at *Nicoſia* is replaced by that of gall-nuts, if the ſkins are intended for yellow.

To tan or vat the *Morocco*, in *Provence*, they make uſe of the leaves of *Roudou* (*Rhus myrtifolia*, C. B. p. 471) that is, *Myrtle-leaved Sumach*, which I have ſpoken of before in the Art of Tanning; they uſe alſo the leaves of the *Raſtenele* or *Maſtick* tree. The leaves of theſe three ſhrubs are indifferently made uſe of; for, by either of them, the *Morocco* is tanned in a ſhort time, and acquires a brown colour. The *Raſtenele* is the ſame as the common *Lentiſcus* of moſt of the botaniſts: it is called by *Linnæus*, *Piſtacia foliis abrupte pinnatis, foliolio lanceolatis*, *Spec.* p. 1026, firſt edit. At *Paris*, they prefer gall-nuts to ſumach, though they coſt more, becauſe they have more ſtrength, and make the fleſh of the ſkins whiter.

Of Confit or Maſtering of Bran.

In the iſland of *Cyprus*, after the operation of ſumach, they make a diſtinction between ſkins intended for different colours; thoſe that are to be yellow, go into the gall-nut; but thoſe that are to be red, are worked with *bran*, *figs*, and *ſalt*.

The firſt *maſtering* is a paſte made with bran, in which the ſkins are piled for two days, one upon another; at the end of which time they are taken out, cleanſed with the peeling inſtrument, (which is made much like our curriers knife,) well waſhed with clean water, and drained by extending them on poles. At *Diarbékir*, they make a kind of pap with bran, in which the ſkins are ſteeped for three days in ſummer, and ſix in winter.

Of Confit or Maſtering with Figs.

At *Nicoſia*, whilſt the ſkins are draining, they prepare a maſtering with figs; for which they take thirty pounds of dried figs, boiled in thirty quarts of water, until they are reduced into a kind of pap; forty ſkins are ſoaked in this for twenty-four hours, which ſoftens, ſwells, and dilates them, and raiſes a kind of fermentation, which cauſes the red dye to penetrate with more facility.

After this, they are waſhed clean in freſh water, and when drained, they are ſprinkled with fifteen or ſixteen pounds of very fine powdered ſalt, and piled one upon another, in which ſtate they remain a fortnight; longer might ſpoil them. This produces a new fermentation ſimilar to that I have mentioned on ſtrong hides, raiſed by oak liquor, which the tanners alſo ſalt. At the expiration of the fortnight, they are ſteeped and waſhed ſeven or eight times in freſh water, hung and drained, after which they are dyed. This is the mode of preparation in the iſland of *Cyprus*.

Continution of the River-work, at Paris.

At *Paris*, when the ſkins come out of the *maſtering* of dogs dung, they are rinſed, and another working given them on the fleſh ſide with the round knife; this is the ſixth working. After which they are trod for the fifth time, and ſoaked in water five or ſix hours, as in the other workings; they are then worked again with the ſleeking ſlate, as before the maſtering; this is the ſeventh working: and immediately they are worked on the grain and fleſh ſide, which is the eighth; they are trod for the ſixth time, and ſteeped again, taken out, and a ninth working given on the grain and fleſh ſide; this done, they are trod a ſeventh time, and ſteeped in a vat of water; they then receive a tenth working on the grain alone; they are trod for the eighth time, ſteeped in a vat of water, taken out to drain, which is the eleventh and laſt working. In the draining they are worked on the grain and fleſh ſide: when rinſed and drained for two hours, they are prepared for the colour.

It is evident, by theſe eleven workings, of which many are doubled, how laborious the manufacture of *Morocco* is. Goat ſkins require this tedious operation, being naturally ſtiff and hard.

Of aluming the Skins.

When the ſkins have been waſhed and wrung with an inſtrument made for that purpoſe, they are prepared for the dye, the firſt operation of which is to alum them. Take twelve pounds of *Roman* alum for every eight dozen of ſkins, which diſſolve in two buckets of hot water, containing fifteen quarts each.

The *Morocco* dreſſers prefer *Roman* alum to all other kinds; it is of a reddiſh colour, and brittle. *Engliſh* alum blackens the ſkins, and is not ſo good in any reſpect.

The ſkins are folded fleſh againſt fleſh, that the grain alone may be alumed, and thus dipped in a pail of alum lukewarm; it is ſtirred in it for the ſpace of half a minute, taken out, and put on a beam four feet high, placed in the work-houſe for that purpoſe.

The alum water drained out, they are wrung with a wooden wringer (iron is not to be uſed) and hung on a wooden beam placed in a corner of the work-houſe to drain, placing an alum bucket under them to ſave the water that drops from them; they are wrung two at a time, after which they are *ſleeked* on the beam to take out the folds, and folded fleſh to fleſh.

The bucket in which the ſkins are alumed is ſomewhat ſhorter and broader than that in which they are coloured, and which I ſhall deſcribe hereafter. It requires one hour and a half to alum eight dozen of ſkins.

The alum water is preſerved, and ſerves again by adding alum and water to repair what it has loſt; and at the ſecond mixture it requires not more than nine or ten pounds of alum.

Of the Manner of dying red Morocco in the Iſland of Cyprus.

The ſkins being alumed, are prepared for the dye. This article properly belongs to the dyer; but as the *Moroquiniers* are accuſtomed to dye their *Morocco*; I ſhall follow them in this operation.

I ſhall begin with red *Morocco*, being moſt eſteemed and moſt in uſe. The colouring matter is kept a very great ſecret in *France*, where they ſay it is compoſed of the mixture of a great number of drugs. M. *Geoffroy* the younger ſays, in a manuſcript, that he was informed they uſed ſtick-lacque, reduced into powder with gall-nuts, alum, and a little cochineal. In *Cyprus*, they uſe none but kermès.

The kermès, or chermès, in Latin *Coccus baphica*, *Coccus infectorius*, *Scarlatum*, ſcarlet grain, or Venetian ſcarlet, is a gall-inſect hatched and found commonly on the ſhrub called *Ilex acculeata Cocci glandifera*, or the holm oak. In *Languedoc*, it is called *Vermillion*. Some authors have alſo called it *Cochineal*; but theſe muſt be well diſtinguiſhed: cochineal is an inſect which lives on the opuntia or Indian fig, and of which a much finer dye is made, which is the true ſcarlet: I ſhall ſpeak of this hereafter. The *Kermès* is about the ſize of a lentil; it is gathered in *Languedoc, Provence*, and *Spain*. See M. *de Reaumur*, who has given a very good deſcription, of it in his *Hiſtory of Inſects*: ſee alſo *Marſigly*, *Hiſt. Phyſ. of the Sea*, *The Phyſical Dictionary*, *The Dictionary of Commerce*, *M. Hellot*, *Mem. Acad.* 1741, pag. 50. *M. de Bomare*, *Diction: of Natural Hiſtory*.

For forty ſkins they take twenty-five ounces of the fineſt kermès that can be procured. It coſts at *Paris* from four livres to one hundred and ten ſols *French* the pound, containing ſixteen ounces; when dried it is powdered, then boiled in eight quarts of water *, and when it has taken one boil, a fifth of a pound of alum is flung into it, divided into five or ſix parts, and kept boiling half a quarter of an hour, in which time all the alum is caſt in; then the liquor is ſuffered to boil till it has diminiſhed four or five fingers, and the dye is made. The more alum is added the deeper the dye, on the contrary the more lively it will be in proportion to the leſſer quantity of that ſalt.

The colour being thus made, about a pint and a half is poured into a veſſel whilſt lukewarm, into which a wiſp of cotton is dipped, and rubbed on the grain ſide of the ſkins; when the dye is laid on they are wrung in the ſame manner as a wet cloth would be, to ſqueeze the water out. When the forty ſkins are thus dyed and wrung, they begin again with the firſt, which is a ſecond time dyed with the cotton ſoaked in the colour, and again wrung as at firſt; all theſe ſkins are thus dyed and wrung five times.

This done, fifteen pounds and a half of gall-nuts finely powdered are added to ten quarts of cold water; the forty ſkins are ſoaked in this liquor one after another; when taken out of the gall-nut, they are waſhed ten or twelve times in very clean water, and careleſsly flung one over the other, trod with the feet, and worked with the hands, to get the water out; when the water is well expreſſed, they are brought into dry lofts, where they are extended on the floor.

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* The quart of *Paris*, to which I have reduced the *Levant* meaſure, contains forty-eight cubic inches, and weighs about two pounds.

Theſe ſkins thus extended, the hand is dipped in oil of *ſeſame* (a kind of corn) with which each ſkin is rubbed on the grain ſide; this gives it a luſtre and ſoftneſs, and prevents its criſping; they are afterwards dried in the ſhade or in the ſun. Such is the proceſs at *Nicoſia* for colouring red *Morocco*.

The method of dying the ſame as at Paris.

At *Paris* the dye of *Morocco* is different, and carried on in a different manner. They uſe a copper boiler well tinned; as copper untinned would hurt the colour, they are frequently obliged to tin this boiler; it is twenty-eight inches in depth, and twenty-ſeven in diameter. In this they put the drugs appropriated for the dye, which, according to M. *Geoffroy*, conſiſts of *ſtick-lacque* reduced to powder with *gall-nuts*, *alum*, and a ſmall portion of *cochineal*. M. *Barois* has aſſured me that M. *Geoffroy* is totally miſtaken; but that is of no conſequence, ſince with *kermès* alone this dye may be made in the higheſt perfection.

The *cochineal* is a ſmall inſect, the inhabitant of a fat plant, called *Raquette*, *Cardaſſe*, *Nopal*, *Opuntia*, or *Indian Fig*; it is cultivated with great care at *Mexico*, and is there dried for foreign markets. This drug coſts at *Paris* about twenty-four livres a pound, and is uſed for the fineſt ſcarlet dye.

Over the boiler is placed a linen ſieve, upon which clean water is poured; this ſieve is to prevent duſt from entering into it. Whilſt boiling, the mixture is ſtirred from time to time with a wooden rake, to raiſe the drugs, which otherwiſe would precipitate to the bottom of the boiler and ſtick to it; hot water is added as it diminiſhes in boiling, for which purpoſe a ſmall kettle of water is placed on the furnace. The boiler is ſupported in a brick furnace by trunnions on each ſide, ſo that there is a ſpace between the vat and the work, that the heat may ſurround the vat on all ſides; the funnel of the furnace is ſplayed off, ramping or inclined, ſo as to enter a chimney below the ſurface of the vat: this attention is neceſſary for the greater neatneſs. The upper liquor of the boiler is drawn off into a leſſer boiler of eighteen inches in depth, and eighteen or twenty in breadth. This muſt alſo be covered by a ſieve, and kept up by a moderate heat, ſo as the hand may be held in it; the heat is neceſſary to make the colour take; but if it was too hot, it would ſhrivel the ſkins, render them like parchment, and ſpoil them. Beſides, the colour clarifies itſelf in this boiler, by depoſiting its dregs. With a pewter veſſel they take out a pound and a half, or three half-pints, of this colour, which is poured into a trough placed on an inclined plane.

The ſkins being folded belly to belly, lengthways, with the grain outward, as already deſcribed, the workman takes it with both hands, and paſſes it in the trough from end to end, bringing it towards him five or ſix times; he then turns the other end of the ſkin, holding the head with his right hand, that the half which was above may be ſoaked in its turn, and thus he continues to paſs the ſkin in the trough, until the liquor that was poured in be almoſt inbibed; he then flings out the remainder, and proceeds with another ſkin in the ſame manner. The tail part muſt be firſt ſoaked in the deepeſt part, becauſe it requires moſt colour, and they lay it down by degrees, to bring the head to the middle of the trough, which part contains leaſt liquor, as the trough is on a ſlope, and thus it appears equally dyed in all parts. When the ſkins are dyed and ſoaked they are placed on the beam, ſmoothly, and without folds, one on the other, forty-eight of which are placed at one end of the beam and forty-eight at the other. When the eight dozen are thus placed, the firſt heap is turned over, laying thoſe at top now at the bottom.

When all the ſkins have been paſſed three times (ſometimes four) in the colour, they are put into a bucket of clear water unfolded, the better to waſh them; after which they are flung on a beam, where they are extended one upon another, grain to grain, and fleſh to fleſh.

The manufacturers ſay that thunder is prejudicial to theſe colouring boilers, that is, that a thunder ſtorm may turn them, therefore it is better to poſtpone this work ſhould the weather prove doubtful.

The ſkins being dyed and ſoaked the third time, they are rinſed, unfolded, taken by the two pattes, dipped in a pail one after another, and extended on the middle of the beam, grain to grain, and fleſh to fleſh, that the colour may have time to penetrate the better; the extremities muſt be folded back on the ſkins, that they may not loſe of their colour; they are thus left the whole night, or at leaſt they are let to drain five or ſix hours, at which time they are fit to be flung into the gall-vat.

The bottom of the trough in which the *Moroccos* are dipped is thirty inches by thirteen; but, as it widens, it has forty inches by twenty-five on the edges, and about one foot in depth. It muſt be made of deal; oak is bad, as it browns the colour and ſpots the ſkin: for greater nicety, it ſhould be lined with lead or tin.

Three workmen are employed in this operation: one pours out the colour, the ſecond dips the ſkins, and the third puts it on the beam. Theſe three men are about twelve or fifteen hours colouring eight dozen of ſkins.

The quality of the water is a material thing to the colour of *Morocco*; rain water is too hard: there are alſo ſome nice circumſtances of which one is not always maſter, for, with the ſame drugs and the ſame water, a finer colour will be obtained at one time than at another.

The *lacca*, *lacque*, or *lake*, is a kind of wax or reddiſh reſin, gathered in *India*, on the branches of trees, where it is depoſited by flies: this reſin, boiled in water with ſome acids makes a dye of a very fine red. The lacque is brought to us in ſticks from *Bengal*, *Pegu*, and *Siam*. The Eaſt-

India company carries on this commerce: it coſts about ſix livres a pound at *Paris*. *Grain lacque* is that which is detached from the ſticks by paſſing it between two ſtones: it is from this grain lacque that ſealing-wax is made. M. *Hellot* (Mem. Acad. 1741, p. 64) gives a method of extracting this colour by means of the great *comfrey root*.

It is this dye which, the author of the Dictionary of Commerce, ſays, is uſed in the *Levant* for dying *Morocco*: I have before obſerved, that it is the *kermès* they make uſe of at *Nicoſia*; but, at *Diarbékir* they uſe the *lacque* or *cochineal*, and M. *Geoffroy* thought it was the ſame at *Paris*.

The *Laplanders*, to redden their ſkins, wet them with their ſpittle, after which they chew *tormentil* root, and rub the ſkins with the dregs, which gives a tolerable good red; it is probably owing to the urinous ſalt of the ſpittle, which luſtres the dye of this root. This volatile urinous ſalt, common to all animal liquors, produces the ſame effect on the *orchel*, which is a kind of moſs the dyers uſe with lime and urine.

Of the Red Morocco Vat.

Red Morocco requires the vat. At *Paris* the day after the ſkins have been coloured, they proceed to the vat, which is made of gall-nuts: but the vat is to precede the dying of *yellow Morocco*. The gall-nut is a kind of excreſcence found on the oak: the beſt come from the *Levant*, *Smyrna*, *Aleppo*, and *Tripoli*; thoſe of *Aleppo* are reputed the beſt: the *French* galls growing in *Gaſcony* and *Provence* are greatly inferior to them, being generally ſomewhat red, light, and ſmooth, whereas thoſe of the *Levant* are heavy and thorny: this perhaps has given them the name of thorny gall, or rather *Galle Alepine*, becauſe they come from *Aleppo*. The galls from the *Levant* are of three kinds; the black, green, and thoſe which are half white: the dyers uſe them according to their quality: the black and the green dye black, and the white dye linen. The light galls, the produce of *France*, which are called *Caſſenolles*, are uſed by the ſilk-dyers to make a black: ink is alſo made with black and green galls: of theſe kind of galls alſo is made hatters black, mixed with log-wood, verdigriſe and copperas, or vitriol of mars: this black, when the hatters have done with it, is uſed by the curriers.

Mixed galls coſt 72 *livres* a hundred before the war; in 1763 they were raiſed to 160 *livres*, but theſe galls are mixed with black and white, and only the white is to be uſed for *Morocco*: the black is ſold to the hatters for their dye. It requires ninety-ſix pounds of white galls for 96 ſkins, which is the quantity that four men can turn at once in the vat.

Put fifty pound of galls, powdered and ſifted, into cold water, which being ſtirred a little, the ſkins are flung in, and the vat kept ſtirring. One hour after add twenty pounds more of galls, and an hour after, the remainder of the ninety-ſix pounds, whilſt four men keep them continually ſtirring with ſhovels, for twelve or fifteen hours without intermiſſion.

The vat in which theſe ninety-ſix ſkins are turned, muſt be of deal, never of oak: it muſt be four feet and a half diameter, by three feet in height. Thoſe who ſtir the ſkins, bring thoſe which are in the middle, now and then, to the edges of the vat, that the galls may be equally diſtributed, and penetrate the whole. When theſe men go to their meals, they are relieved by others, that there ſhould be no ſtop in this operation.

The ſkins being left all night in the vat, finiſhes the tanning: a board is placed acroſs the vat to drain them and to unfold them, and the ſkins are immediately put down again; this is twice done in the ſpace of fifteen hours. Care muſt be taken whilſt the ſkins are at reſt in the vat, to ſpread the uppermoſt with the fleſh outwards, to preſerve the reſt, and thus they paſs the night in the vat, ſometimes twenty-four hours, if the ſeaſon requires it; but this is ſeldom done. Iron about the vat would be dangerous; and in general, in all operations of ſkins, and particularly of *Morocco*, it is carefully to be avoided.

The *Gall-vat* is uſed in *Nicoſia* before colouring, for thoſe ſkins which are intended for yellow; (red *Morocco* requires before the dye, ſumach, maſterings, and ſalt only,) for every forty ſkins that are to be dyed yellow, a cold infuſion is made during ſix or ſeven hours, of eighteen or twenty pounds of galls in eight or nine quarts of very clear water; the ſkins are ſteeped in it twenty-four hours, obſerving that there be juſt liquor ſufficient to moiſten the ſkins without floating on the top; they are taken out at the expiration of twenty-four hours, and are well waſhed in freſh water, then dried, both in the ſhade and in the ſun; after which they are a ſecond time waſhed again and dried as before: this is the preparation for *Morocco* intended to be dyed yellow.

Continuation of the red Morocco in the Levant.

Red *Moroccos* being dyed, they are put into a decoction of galls: this is done at *Nicoſia*, at *Diarbékir*, and at *Paris*.

At *Diarbékir* the red morocco is only prepared with fecal matter and bran; finiſhed with the *muſt* of the *grape*, or *honey*, *ſalt*, *gum lacque*, or *cochineal*, *alum*, and afterwards *galls*, which makes the laſt operation. For every fifty ſkins prepared with dogs dung and bran, they take eighteen pounds and three quarters of *Pecquemeſe*, which is the muſt of the grape, or in defect of this, ſo much liquid honey, which is ſo heated as to bear the hand; the ſkins are dipped in one after another, piled, covered over with a packing-cloth, and thus left for three days, at the end of which they are waſhed two or three times in water, in which nine pounds ſix ounces of common ſalt has been diſſolved, after which they are half dried.

Whilſt the ſkins are drying, they put eighteen pounds three quarters of *gum lacque*, into one hundred and eighty-ſeven pints and a half of water, and in defect of *lacque*, three pounds, eight ounces, and two drachms of cochineal powdered, into one hundred and fifty pints of water; it is diluted in the water, and boiled for three hours, with about forty drachms of powdered alum: when it is cooled ſo as to bear the hand, the fifty ſkins are rubbed over with it, one after the other;

this is four times repeated, obſerving each time to extend and pile them one upon another. They are then dipped one after the other in cold water, in which fifty drachms of alum has been diſſolved; when half dried they are ſoaked and trod in a decoction of galls prepared, as I ſhall ſhew on the ſubject of black or yellow *Morocco*; afterwards they are waſhed in freſh water, dried in the ſhade, or by a temperate ſun: when dry, they are *ſleeked* and *luſtred* with linſeed oil, like the black morocco. The dying of red and yellow morocco muſt be done in a warm place.

Continuation of the red Morocco at Paris.

I ſhall now return to the *Moroccos* at *Paris*, which have been dyed red and put in the vat. When taken out of the gall-vat, they muſt be waſhed in a clear water, to take off the ſuperfluous gall, as was done when taken out of the dye. When waſhed, two men hand-wring them by pairs; they are ſhook and extended lengthways on a table, to receive the oil one after another, the fleſh ſide being on the table, and the grain upwards.

The oil is contained in a wooden bowl; a ſpunge about the bigneſs of an egg, or a ſwab of wool, is dipped in the oil, and paſſed on the grain to ſoften them, and to prevent the air from crimping and hardening them; they are hanged on hooks by the pattes, the head downwards, grain to grain, at a ſmall diſtance from each other, and are ſo diſpoſed, that the current of air may ſtrike ſide-ways in the intervals, for if it ſtruck the ſurface of the grain, it would deſtroy the colour. About two pounds of oil are required for the eight dozen of ſkins, and two men half a day to ſhake, oil, and hang them up.

At *Nicoſia* they uſe oil of *ſeſame*, or of *jugeoline*, which is the oil moſt uſed in the *Levant*.

Theſe moroccos remain one or two days (more or leſs, according to the weather,) in the drying-loft; ſometimes they are taken down the ſame day: in winter they often require a week: however they are taken down as ſpeedily as poſſible.

Being thoroughly dry, they muſt be curried and glazed, being firſt folded two by two in ſmall whiſps, grain to grain, and trod on a clean floor, two at a time, with curriers ſhoes, made for that purpoſe. One man may tread four or five dozen in a day. Then they are to be grained with a wooden graining-board, lengthways, breadthways, and cornerways, or from corner to corner. A man will grain four dozen a day.

They muſt be *perched* on the fleſh ſide with the perching-knife, rubbing it with whiting, to prevent the knife from entering too far into the ſubſtance of the ſkin.

Black Morocco is glazed with a glaſs, made in the form of an apple, or a flat onion, worked on a table a little inclined: one man can glaze three or four dozen in one day.

Red Morocco is glazed with a wooden roller, held by both hands: and the ſkin extended on an oak-beam, on which there is a piece of pear-tree wood, projecting a quarter or an eighth of an inch: a weight with a ſmall hook is ſuſpended on the ſide of the ſkin, which pulls it down, whilſt the glazier holds and governs it with his thigh, letting it ſlide as neceſſary, in proportion as he advances in his glazing.

Each ſkin is twice glazed, that all intervals and furrows may be effaced by the return of the ſleeker; this alſo makes the grain more ſhining: one man can glaze two dozen a day, for which he is paid twenty-four *ſols* a dozen: this operation is delicate, and requires habit and ſkill to glaze equally and uniformly. The grain is lightly watered with a ſpunge to make the glazer ſlip eaſy, but this is not neceſſary the ſecond time.

Glazing lays down the grain of the *Morocco*, but as the grain is a beauty in *Morocco*, they riſe it again by means of a *cork paumelle*, which is lightly drawn over, without taking off the luſtre, and this is the laſt working of red *Morocco* at *Paris*.

Continuation of the Yellow Morocco *at* Paris.

Morocco ſkins which are to be *yellowed*, require leſs precaution than thoſe which are to be dyed *red*. They are dyed when taken from the vat, and it is the ſame with reſpect to all other colours, except red; they even let them dry after the vat, and theſe they call ſkins in *cruſt*; when they are to be dyed, they are wetted, trod in the water, wrung, half dried, alumed, and then dyed.

The *Avignon berries* is the only ingredient uſed in yellow *Morocco*: it is the grain of a tree called *Rhamnus catharticus minor* (*Caſpari Bauhini in Pinace*,

Pinace, p. 478) and by *Linnæus*, *Rhamnus ſpicis terminalibus floribus, quadrifidis divicis*, Spec. p. 193. (*Hortus Cliffortianus*, 70. *Flora Suecica*, 193.) that is, leſſer buckthorn, or yellow berries: this kind of buckthorn, or this thorny ſhrub, which produces the *Avignon* berries, grows in *Provence*, *Dauphiny*, and *Languedoc*, from whence the berries are brought to the dyers.

One pound and a half of yellow berries in one bucket of water will dye four dozen of ſkins; this colour dyes eaſily, and though done after the vat, it is as ſolid as the red, which is given in *tripe*, that is, before the vat.

At *Nicoſia* they uſe yellow berries, called *halagex*: they get them from *Caramania*, from whence they are brought to *Egypt*, and the iſlands of the *Archipelago*, where the *Rhamnus catharticus* does not grow; and they uſe the common yellow berry alſo.

The deeper the yellow is required, the more it muſt be forced with the berries: it may be brought to an orange.

At *Marſeilles* they manufacture blue and green *Moroccos*; without a minute deſcription of the operation of theſe dyes, ſuffice it to ſay, that a blue is made with *turnſole* and *indigo*; and a green with *verdegreaſe* mixed with a little tartar, or with a mixture of yellow and blue.

Yellow Moroccos *of the* Levant.

At *Nicoſia*, for the yellow dye, they take about five pounds of *halagex* or *Avignon* berries, with one pound and a half of roche alum, which are mixed together and reduced into a very fine powder, and infuſed in ſix quarts of lukewarm water, over a very ſlow fire, for one hour or two, obſerving not to boil the liquor.

They put the forty ſkins, which are to be dyed yellow, into a kind of ſtove, extended on the ground one over the other; then two men taking each the extremities of a ſkin, one of them dips his hand in the yellow liquor, and, without any other inſtrument, paſſes and repaſſes it on the grain of the ſkin: when it is well dyed, they fold it in two lengthways, and as they are dyed, they are piled. They are then turned over five or ſix times, ſtill placing them one over the other, that the dye may penetrate the better.

They are dyed yellow a ſecond time, after the ſame manner, turning and returning them about forty times; after which they are dipped ſeven or eight times in very clean freſh water; they are then dried in the ſhade, perched on the fleſh ſide to take off the filth, and the grain *luſtred* with a ſtick.

Black Morocco *at* Nicoſia.

They take the ſkins when they have paſſed the *ſumach*; for they require neither bran nor figs, as the red *Morocoo*, nor galls, as the yellow *Morocco*: they take ſix pounds of a vitriolic, aſtringent earth, which is found in the iſland of *Cyprus*, and which the natives call *Maurite* or *Maurizi*, and a handful of powdered gall-nuts, which are infuſed together, cold, for two or three hours, in forty-five or forty-eight quarts of water: this liquor is black; each ſkin is rubbed once only, and as ſoon as it is dyed it muſt be immediately well waſhed in freſh water, for without this precaution the dye would burn the ſkin; they are then extended to dry in the ſhade; they make this dye more or leſs black, by adding more or leſs *maurite*; they alſo put a little oil on the ſurface when they are almoſt dry.

In *France*, it is at the coming out of the *ſumach*, or rather of the gall, that the *Morocco* receives the black, after graining with the paumelle, and ſparring: they make the black of ſour beer, in which old iron has been infuſed, as has been ſaid in the Art of Currying: they uſe a ball of horſe-hair or a rough bruſh, which is dipped in the dye, and with which the grain is rubbed twice, ſometimes three or four times, drying the ſkins each time, except the laſt.

At the laſt dying, when they are half dried, they are trod and rubbed, then extended on a table, grained with the paumelle, and a little water flung on them: after ſparring, they come again on the table, to be grained with the paumelle lengthways, acroſs, and from corner to corner, this raiſes the grain; water is again flung on them, and they are glazed afreſh; finally, they are grained a third time with a wooden paumelle.

They then *luſtre* the grain either with barberry-juice, garlick, citron, orange, or ſour beer, being ſtrongly rubbed with a woollen cap or ſwab; the edges are pared on the beam, perched with the perching-knife; and a cork paumelle paſſed over to raiſe the grain: this is the laſt working.

This work is nearly the ſame as that of fat goat ſkins, which I have deſcribed in the Art of Currying. Copperas dries and burns the ſkin, and beer is preferred, becauſe in ſome meaſure it feeds the ſkin, and gives it a ſoftneſs far from burning and drying it. The black made of beer is beſt when old; it can ſcarcely be uſed before three or four months, whereas that of copperas may be made uſe of as ſoon as made, and this is the reaſon bad workmen prefer it.

Continuation of Black and Yellow Morocco *at* Diarbékir.

At *Diarbékir*, the ſkins which are to be put in black or yellow paſs into the gall, but for the red they uſe the muſt of grapes or honey: for fifty ſkins intended to be yellowed or blackened, they take two *battemens*, or twelve *ocques* of powdered galls, which is diluted cold, as a liquid pap, in three *ocques* of water (an *ocque* weighs four hundred drachms, or three pounds two ounces, *French* weight); as ſoon as the galls are ſoaked ſufficiently and precipitated, the ſkins are put in and trod with the feet one after another, which is repeated three times in two hours; they are then left to ſoak in the decoction of gall till the next morning; when the gall pap is too thick, water is added to it.

The next day the ſkins are taken out, worked on the fleſh ſide, trod three or four times ſeparately, and when well cleanſed, they are again put into freſh decoction or pap of galls, ſuch as the firſt, well waſhed in cold water, and then dryed.

When dried, and to be dyed yellow, for every fifty ſkins, they take two *ocques* of grain of *Jara*, or berries of *Avignon*; this is the grain or berry of a ſpecies of *Lycium* of *Caraminia*; *Rhamnus catharticus*; to which is added fifty drachms of powdered alum, which is diluted, like thin pap, in a ſufficient quantity of hot water; with this dye they rub the ſkins, which muſt be moiſt to take the dye rightly; this operation muſt be done in a hot place.

When dyed, they are folded and piled one over another, and thus left till next day, when they are lightly waſhed in cold water, in which forty drachms of alum has been diſſolved, which ſtrengthens the dye and the ſkin; they are then dried and glazed, without uſing any kind of oil as a luſtre.

At *Diarbékir*, for black *Morocco*, they uſe powdered galls twice, as for the yellow; when waſhed and dried, they take two pounds of a vitriolic ferrugineous earth, which they call *caraboya*, which is diſſolved in a ſufficient quantity of water; when the water is well loaded with it, the ſkins are rubbed with it till they appear of a fine black; they are then waſhed in freſh water, dried in the ſhade, glazed, and, laſtly, luſtred with oil of *Bezeriane*, or linſeed oil.

Of the Commerce of Moroccos.

Red *Moroccos* are ſold, at *Paris*, from ſixty to eighty *livres* a dozen, weighing from eleven to fourteen pounds a dozen, when entirely finiſhed.

The yellow, blue, or green *Moroccos* are ſold from forty-eight to ſixty livres a dozen; and the black *Moroccos* from fifty to fifty-five or ſixty livres.

Morocco is uſed by tapeſtry-workers, ſhoe-makers, belt-makers, ſadlers, caſe-makers, and trunk-makers; it is the moſt eſteemed, the deareſt, and the fineſt of all leathers: ſhoes made of black *Morocco* have this advantage, that they are cleaned with a ſponge and vinegar, which reſtores their colour, and does not daub or ſoil the ſtocking.

Spaniſh Moroccos are moſt eſteemed for goodneſs, yet thoſe of *France* are often more beautiful; but for quality and brightneſs of colours, thoſe of the *Levant*, *Conſtantinople*, *Cyprus*, *Aleppo*, and *Smyrna*, are the moſt ſought after.

The book-binders take only the ſmalleſt, fineſt, and thinneſt *Moroccos*, and often pare them on the fleſh ſide to make them thinner; they pay from ſixty to ſixty-ſix livres a dozen.

They manufacture *red baſils* at *Limoges*; theſe are ſheep ſkins dyed red, with leſs precaution than *Morocco*: they are much eſteemed at *Paris*.

White *Morocco* is prepared much like *tawyers ſkins*, of which I ſhall give a particular treatiſe in the Art of Leather-Dreſſing. In this manufacture, they uſe ſome drugs to preſerve the white not known to the tawyers, and which have not yet come to my knowledge. The river-work of white *Morocco* is carried on the ſame as for the red, becauſe goat ſkins are very ungrateful and difficult to be worked. After all the different workings, that is, after the draining, they give it the bran maſterings, where it remains four or five days in ſummer, and eight in winter. When the maſtering has roſe ſeveral times, and that it falls of itſelf, and riſes no more; they whiten the ſkins with a paſte made of eggs and milk as in *tawing*: they alſo pretend, that to prevent their ſpotting and ſpoiling eaſily, that there is another ſecret ingredient added which ſtrengthens the grain of the white Morocco: if ſo, this muſt be an aſtringent. They are then grained by means of the currier's graining board, which muſt have a rough paumelle; they are luſtred by rubbing them with a clean and dry linen.

White Moroccos are leſs uſed in *France* than in *Italy*, where large quantities are brought from *Smyrna*. The *Italian* women's ſhoes are made of it, and it has this advantage over all other white ſkins, that it is eaſily cleanſed when ſoiled, being ſufficient to waſh it, and when dry to rub it with a cloth, by which it recovers all its quality and brightneſs.

The *cordouans* are leathers very like Morocco, but tanned with bark, in which they differ from Morocco, which are only tanned with ſumach and galls; probably this denomination comes from the city of *Cordoua* in *Andaluſia*, the ſame as *Ruſſia*, *Hungary*, and *Morocco* have given their names to other kinds of leather.

Proceſſes for dying Leather Red, and Yellow, as practiſed in *Turkey*, with directions for preparing and tanning the ſkins, as communicated by Mr. *Philippo*, a native of *Armenia*, who received from the Society for the Encouragement of Arts, &c. one hundred pounds, and alſo the gold medal of the Society, as a reward for diſcovering this ſecret.

ARTICLE I.

Firſt preparation for the Skins, both for Red and Yellow Leather, by dreſſing them in lime.

LET the ſkins, dried with the hair on, be laid firſt to ſoak in clean water for three days; let them then be broken over the fleſh ſide, put into freſh water for two days longer, and afterwards hung up to drain half an hour. Let them now be broken again on the fleſh ſide, limed in cold lime on the ſame ſide, and doubled together with the grain ſide outward. In this ſtate they muſt be hung up within doors over a frame for five or ſix days, till the hair be looſe; which muſt be then taken off, and the ſkins returned into the lime-pit, for about three weeks. Take them out, and let them be well worked, fleſh and grain, every ſixth or ſeventh day during that time: after which, let them be waſhed ten times in clear water, changing the water at each waſhing. They are next to be prepared in drench, as below mentioned.

Article II.

Second Preparation of the Skins for both the Red and Yellow Dyes by drenching.

After ſqueezing the water out of the ſkins, put them into a mixture of bran and water, warm as new milk, in the following proportions, viz. about three pounds of bran for five ſkins, and water ſufficient to make the mixture moderately fluid, which will be about a gallon to each pound of bran. In this drench let the ſkins lie three days; at the end of which time they muſt be well worked, and afterwards returned into the drench two days longer. They muſt be then taken out and rubbed between the hands; the water ſqueezed from them, and the bran ſcraped off clear from both ſides of the ſkins. After this they muſt be again waſhed ten times in clear water, and the water ſqueezed out of them.

Thus far the preparatory proceſs of all the ſkins, whether intended to be died red or yellow, is the ſame; but afterwards thoſe which are to be dyed red, muſt be treated as follows.

ARTICLE III.

Preparation in Honey and Bran of the Skins that are to be died red.

Mix one pound of honey with three pints of luke-warm water, and ſtir them together till the honey is diſſolved. Then add two double handfuls of bran; and taking four ſkins (for which the above quantity of the mixture will be ſufficient) work them all in it one after another. Afterwards fold up each ſkin ſeparately into a round form, with the fleſh ſide inwards, and lay them in an earthen-pan, or other proper veſſel; if, in the ſummer, by the ſide of each other, but in the winter on the top of each other. Place the veſſel in a ſloping poſition, ſo that ſuch part of the fluid as may ſpotaneouſly drain from the ſkins, may drain from them. An acid fermentation will then riſe in the liquor, and the ſkins will ſwell conſiderably. In this ſtate they muſt continue for ſeven or eight days; but the moiſture that drains from them, muſt be poured off, once or twice a day, as occaſion may require. After this a further preparation in ſalt is neceſſary; and which muſt be performed in the following manner.

ARTICLE IV.

Preparation in Salt, of the Skins to be dyed red.

After the ſkins have been fermented in the honey and bran, as above-mentioned, let them be taken out of that mixture on the eighth or ninth day, and well rubbed with dry common ſea ſalt, in the proportion of about a half a pound to each ſkin;

the ſalt muſt be well rubbed and worked with them. This will make them contract again, and part with a further conſiderable quantity of moiſture; which muſt be ſqueezed out by drawing each ſkin ſeparately through the hands. They muſt next be ſcraped clean on both ſides from the bran, ſuperfluous ſalt, and moiſture that may adhere to them. After which, dry ſalt muſt be ſtrewed over the grain ſide, and well rubbed in with the hand. They are then to be doubled with the fleſh ſide outward, lengthways from neck to tail, and a little more dry ſalt muſt be thinly ſtrewed over the fleſh ſide, and rubbed in; for the two laſt operations about a pound and a half of ſalt will be ſufficient for each ſkin. They muſt then be put, thus folded on each other, between two clean boards, placed ſloping, breadthways; and a heavy weight laid on the upper board, in order gradually to preſs out what moiſture they will thus part with. In this ſtate of preſſure, they muſt be continued two days or longer, till it is convenient to dye them, for which they will then be duly prepared.

ARTICLE V.

Preparations of the Red Dye, in a proper proportion for four Skins.

Put eight gallons of water into a copper, with ſeven ounces of Shenan*, tied up in a linen bag.

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* Shenan, is a drug much uſed by dyers in the Eaſt; and may eaſily be procured at any of the ports of *Syria* and *Africa* in the *Levant*. It is the eaſtern jointed cali, called by the botaniſts ſelicornia; and

Light a fire under the copper, and when the water has boiled about a quarter of an hour, take out the bag of ſhenan, and put into the boiling fluid or lixivium, 1ſt, two drachms of alum; 2dly, two drachms of pomegranate bark; 3dly, three quarters of an ounce of turmeric; 4thly, three ounces of cochineal; 5thly, two ounces of loaf-ſugar. Let the whole mixture boil about ſix minutes, then cover the fire, and take out a quart of the liquor, putting it into a flat earthern pan, and when it is as cold as new milk, take one ſkin, folded lengthways, the grain-ſide outwards, and dip it in the liquor, rubbing it gently with the hands. Then taking out the ſkin, hang it up to drain, and throw away the ſuperfluous dye. Proceed in the ſame manner with the remaining three ſkins; repeating the operation on each ſkin ſeparately, eight times, ſqueezing the ſkins by drawing them through the hands before each freſh dipping. Lay them now on one ſide of a large pan, ſet ſloping, to drain off as much

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and grows in great plenty in thoſe and other parts of the Eaſt. There is a leſſer ſpecies of the ſelicornia on our coaſt, which, from its great affinity with the ſhenan, might be preſumed to have the ſame qualities. On ſome trials, however, it has not appeared to anſwer the intention of the ſhenan; but it will be prudent to purſue the examination of this further, as ſome unknown circumſtances in the collecting or uſing the *Engliſh* ſelicornia, might occaſion the miſcarriage. But be this as it may, the eaſtern ſhenan may at all events, be eaſily procured in any quantity, at a very trifling expence, by any of the captains of *Turkey* ſhips, at *Aleppo*, *Smyrna*, &c.

of the moiſture as will run from them without preſſure, for about two hours, or till they are cold; then tan them, as below directed.

ARTICLE VI.

Tanning the Red Skins.

Powder four ounces of the beſt white galls, in a marble mortar, ſifting it through a fine ſieve. Mix the powder with about three quarts of water, and work the ſkins well in this mixture for half an hour or more, folding up the ſkins four-fold. Let them lie in this tan twenty-four hours, when they muſt be worked again as before; then taken out, ſcraped clean on both ſides, from the firſt galls, and put into a like quantity of freſh galls and water. In this freſh mixture they muſt be again well worked for three quarters of an hour; then folded up as before, and left in the freſh tan for three days. On the fourth day they muſt be taken out, waſhed clean from the galls, in ſeven or eight freſh quantities of water, and then hung up to dry.

ARTICLE VII.

Manner of dreſſing the Skins after they are tanned.

When the ſkins have been treated as above, and are very near dry, they ſhould be ſcraped with the proper inſtrument or ſcraper on the fleſh ſide, to reduce them to a proper degree of thickneſs. They are then to be laid on a ſmooth board, and glazed, by rubbing them with a ſmooth glaſs. After which they muſt be oiled, by rubbing them with olive oil, by means of a linen rag, in proportion of one ounce and a half of oil for four ſkins: then they are to be grained on a graining-board, lengthways, breadthways, and cornerways, or from corner to corner.

ARTICLE VIII.

Preparation with Galls, for the Skins to be dyed yellow.

After the four ſkins are taken out of the drench of bran, and clean waſhed, as before directed in the ſecond article, they muſt be very well worked half an hour or more, in a mixture of a pound and a half of the beſt white galls, finely powdered, with two quarts of clean water. The ſkins are then to be ſeparately doubled lengthways; rolled up with the fleſh ſide outwards, laid in the mixture, and cloſe preſſed down on each other, in which ſtate they muſt continue two whole days. On the third day let them be again worked in the tan; and afterwards ſcraped clean from the galls, with an ivory or braſs inſtrument (for no iron muſt touch them.) They muſt then be put into a freſh tan, made of two pounds of galls finely powdered, with about three quarts of water, and well worked therein fifteen times. After this they muſt be doubled, rolled up as before, and laid in the ſecond tan for three days. On the third day a quarter of a pound of white ſea ſalt muſt be worked into each ſkin; and the ſkins doubled up as before, and returned into the tan, till the day following, when they are to be taken out, and well waſhed ſix times in cold water, and four times in water lukewarm. The water muſt be then well ſqueezed out, by laying the ſkins under preſſure, for about half an hour, between two boards, with a weight of about two or three hundred pounds laid upon the uppermoſt board, when they will be ready for the dye.

ARTICLE IX.

Preparation of the Yellow Dye, in the proper proportion for four Skins.

Mix ſix ounces of caſſiari gehira*, or dgehira, or the berries of the eaſtern rhamnus, with the ſame quantity of alum, and pound them together till they be fine, in a marble or braſs mortar, with a braſs peſtle. Then dividing the materials, thus powdered, into three equal parts of four ounces each, put one of thoſe three parts into about a pint and a half of water, in a china or earthen veſſel; and ſtir the mixture together. Let the fluid ſtand to cool, till it will not ſcald the hand. Then ſpreading one of the ſkins flat on a table, in a warm room, with the grain ſide uppermoſt, pour a fourth part of the tinging liquor, prepared as above directed, over the upper or grain ſide, ſpreading it equally over the ſkin with the hand, and rubbing it well in. Afterwards do the like with the other three ſkins, for which the mixture firſt made will be ſufficient.

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* The caſſiari gehira is the berries of an eaſtern rhamnus, or buckthorn tree, and may be had at *Aleppo*, and other parts of the *Levant*, at a ſmall price. The common *Avignon*, or yellow berries, may be ſubſtituted, but not with ſo good an effect; the caſſiari gehira being a ſtronger and brighter yellow dye, both for this uſe, and alſo that of colouring paper-hangings, &c.

This operation muſt be repeated twice more on each ſkin ſeparately, with the remaining eight ounces of the powder of the berries, and alum, with the abovementioned due proportion of hot water put to them, as before directed.

The ſkins, when dyed, are to be hung up on a wooden frame, without being folded, with the grain ſide outwards, about three quarters of an hour to drain, when they muſt be carried to a river or ſtream of running water, and well waſhed therein ſix times, or more. After this, they muſt be put under preſſure for about an hour, till the water be well ſqueezed out; afterwards the ſkins muſt be hung up to dry in a warm room.

This being done, the ſkins are to be dreſſed and grained, as before directed for thoſe dyed red, except the oiling, which muſt be omitted.

FINIS.

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